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On Screen

By Gary M. Kaplan
Publisher & Editor-in-Chief

> **"The popular press has been so vocal in discrediting the Home Computer Revolution that it has effectively created its own myth."**

We've been reading a great deal lately, in both the consumer and business press, about how the "home" computer at its present stage of development has simply *not* "come of age . . . " Its serious application in the home or home-operated business or professional environment has, they say, *not* materialized. And the "Home Computer Revolution" that was supposed to take the American public beyond game playing and child education into the realm of real productivity is now derided as a *myth*! We're told that these machines are incapable of doing anything meaningful without a lot of expensive add-ons. And even then, wisdom has it, the software to take advantage of all this expensive hardware is non-existent . . .

The popular press has been so vocal on this new theme of late that it has effectively created its *own* myth. Consider the recent series of ads from one manufacturer of an ultra-low-cost 2K computer—who for the sake of propriety shall remain nameless at this time(x). They warn the public not to spend more than $50 "in case they find out that they don't really like home computing." This doesn't do much to debunk the gospel of the new media "myth-makers."

How then, does one counter these latest "truths" of home computing? We here at *99'er HCM* believe that each issue we publish is in itself an affidavit of evidence to the contrary. Thumb through some of our recent back issues and you'll find all kinds of useful applications that 99/4A users have implemented on minimal systems. I don't know about users of other machines, but we TI users are on the leading edge of an electronic lifestyle "Third Wave" that will sweep over the industrial world during the rest of this decade—leaving profound change in its wake.

The Home Computer is by no means a "toy." It can be a serious "productivity tool." Yes, it's true that peripherals are needed to do many types of serious work. But the prices of add-ons have been coming down steadily—fueled by the market competition that a magazine such as this brings about. Unfortunately the prices of consoles have plummeted even more rapidly, throwing the *ratio* of console price to add-on cost out of whack.

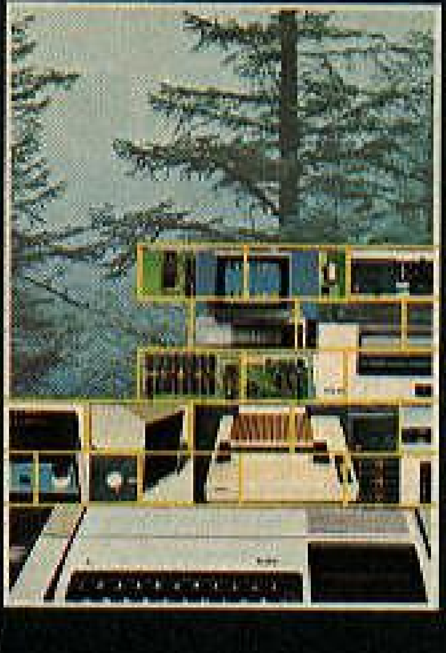
It's funny that we seem to apply one set of cost standards to home computing and another to our more ubiquitous home appliances. We don't really expect to get a very good microwave oven, stereo system, washer and dryer, or color console TV for $100. Why, then, should we expect to get a complete home computer system that can do "everything but make the coffee" for $100? *Complete*, more versatile systems (with printers and mass storage devices) will cost significantly more than $100—the great majority of system configurations will, however, stay well under $1000.

Perhaps some readers remain unconvinced. Can a low-cost system built around a 99/4A really perform "heavy duty" work? Well, the proverbial "proof of the pudding" (no reference to Bill Cosby intended . . .) is in the digesting of this September issue itself. Our friendly 99/4A (equipped with a disk system and RS232 interface) played two very significant new roles in this month's magazine production.

If you will glance at the program listings and compare them to previous issues, you will immediately notice one of the effects: We have finally fully implemented the *automatic typesetting and grid layout* design for optimum readability and fewer reader key-in errors. Through pre-formating and coding software we write on the 99/4A, we're able to "dump" the listing output into our "smart" Compugraphic typesetting machines. Using this process (and some programmed translation tables and grid formating we've developed), we create the camera-ready images you see in this issue. Thanks to the 99/4A, we can do this now *without* camera tricks, cut and paste machinations, and keyboarding. It's a large step forward in efficiency and quality. We're all quite proud of it.

The second new role performed by our versatile 99/4A was its participation as a data-entry terminal and storage device in our production of the *99'er Directory* of third-party wares bound into this issue. We used the *TI-WRITER* software to enter, edit, and "file away" the information on the hundreds of directory submission forms sent us. It was again a simple matter of dumping the files into our typesetting machines, doing some "digital legerdemain," and winding up with finished, camera-ready copy in record time.

So if you were to ask those of us here at editorial and production headquarters if the Home Computer can earn its keep in more serious applications, we'd have to say that the Texas Instruments machine has been a source of posiTIve producTIvity.



99'er HOME COMPUTER magazine

Amid the quiet majesty of evergreen antiquity sits an ever-growing product of modern technology—the Home Computer. The versatile 99/4A console provides a strong foundation upon which to build a structure that will, like the giant redwoods, endure and branch out in every direction. Some may try to predict what this building will look like when it is finished. Others claim it will never be finished because we can lay the bricks of expansion—peripherals and accessories—in an infinite variety of patterns, cementing them together with the mortar of human ingenuity.

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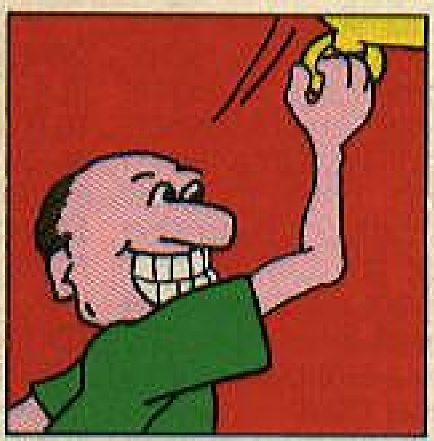

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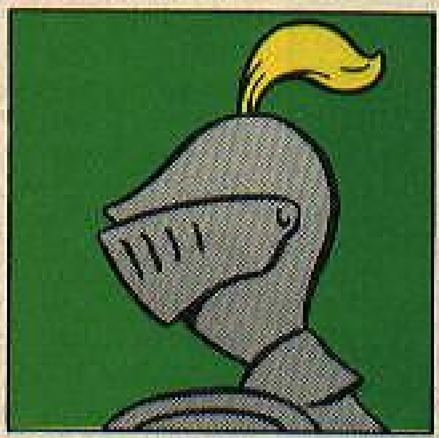

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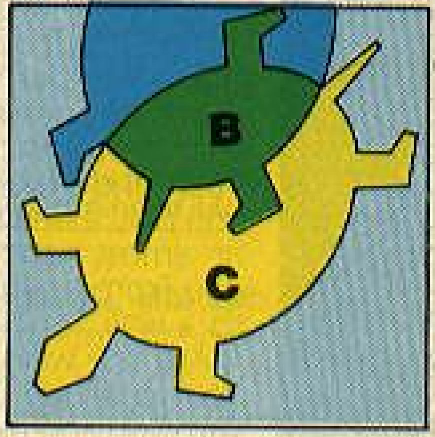

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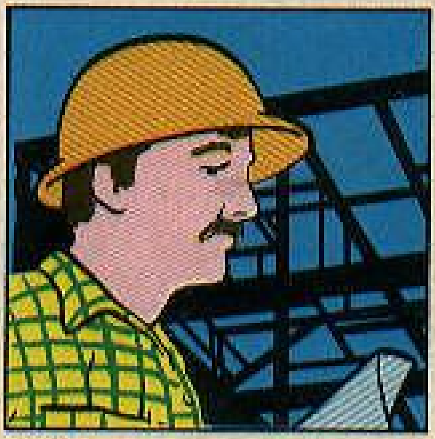

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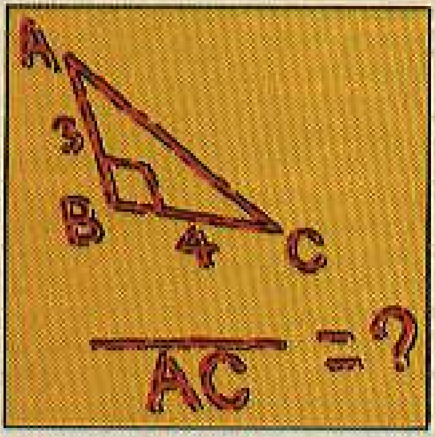

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INSIDE 99'er

Eureka—you've found it! Actually you knew it was out there all the time, didn't you? A veritable mountain of peripherals and software for your Home Computer—but how do you sort out the must-haves from the buy-laters? Is there too much out there to possibly consider everything and make an informed decision? Not for *99'er Home Computer Magazine* readers there isn't. Here, for the first time in one place, we have gathered together, in an easy-access format, more hardware and software than you could shake a cathode ray tube at!

Thanks to the cooperation of the many firms who submitted the data, we are providing you with the *99'er Directory of Commercially Available Software, Peripherals, and Accessories*—an extraordinary resource. From now on you won't have to pour through countless catalogs compiling separate lists prior to making your hardware and software purchases. This is yet another issue of *99'er HCM* that you'll want to put in a safe place where you can keep an eye on it.

With both eyes focused on the *99'er Directory*, you can still use *Peripheral Vision '99* to take a closer look at some new memory expansion devices and clever gadgets to make your console better than ever. Everything from an assortment of memory cards to a fancy light shooter passes in review. This article will certainly shed some light on the dilemma of what and how to add on to your Home Computer.

Another illuminating piece comes to you this month from Professor Holl in *Pocket Sunrise, Part Two.* The Extended BASIC version of last month's dynascape has some surprises in store for those who key in this short but spectacular program.

"Small but mighty fast" describes how Mini Memory can effect game programming in *Byte Lightning.* Using Mini Mem's extra 4K of RAM you can PEEK and POKE about in BASIC while you play a fast-moving game that has an almost instant key response to keep you from banging your light racer into a wall.

Are the walls closing in on you and your console? Do you long to take it with you and free it from its wires and plugs? In *Take the Data and RUN!* you can do just that. Your CC-40 can go with you wherever you need it most to function as the eyes, ears, and auxiliary brain for your 99/4A. When you get home, the CC-40 will tell your 99/4A all it needs to know about the big wide world out there.

The world of word processing opens up to you in our *TI-WRITER Tutorial.* There are many uses for this versatile word processor including some time-saving applications we have come up with here at *99'er HCM*. After reading this article, you'll be privy to some of the trade secrets we use to set TI-WRITER up to serve us here in the publishing business.

Sets will serve LOGO fans well in *Functions, Sets and Turtles.* Find out just how much LOGO can give you when you logically shape up your data.

Getting a high school athlete into geometric shapes is the challenge of *PLATO's Progress* this month. Our visit to the Academy allows us to participate as our learned master examines two courseware packages in the *High School Skills* series—packages which can make hours of studying seem to fly by.

If after-hours flies have been humming mercilessly about your bedroom destroying your attempts to get a good night's sleep, we have just the thing for you. Our Extended BASIC game, *The Fly*, can help you get the best of these pesky little beasties by giving you the opportunity to practice your fly-swatting technique when its "... only a game."

Perhaps you are more of a big game hunter who needs a lofty purpose before you can engage in such aggressive activity. If so, then *The Challenge of Camelot* may be your BASIC ideal. So much is at stake here that you must win a joust to become a knight earning you the right to go out and defend your fair city against the demon dragons of the foothills. Don't forget your Lance, Mace, or Sword or you will be unhorsed and scorched for sure.

So there you have it, straight from the horse's mouth. This month's issue with its regular features, game reviews, and its special pull-out *99'er Directory* gives you the kind of September that's nice to remember—and a fair measure of good (we hope) advice to follow. With your handy *99'er HCM* close at hand you will become a walking, talking information resource. In fact, don't be surprised if, when you go in to make your next computer-related purchase, the salesperson asks *you* "What's new?"

Until next month, keep on reading, learning and RUNing!

LETTERS TO THE EDITOR

Heads Up, Problem-solvers

I would like to propose a new feature or column for your magazine. It could be called "The Problem Corner" or "The Challenge Corner" or whatever. Every month this column could feature one or two programming problems for your readers to wrangle with. Perhaps one easy problem for beginners and one hard problem for more experienced programmers. After all, the best way to learn problem solving and programming is by doing.

The emphasis would be to solve the problem with the most efficient BASIC program possible. Efficient being the fewest program lines and/or taking up the least amount of RAM, and speed of operation. The following month's issue would present a solution to the problem.

This is not intended to be a contest, and it is not intended for readers to send in their solutions/programs. The readers just try to solve the problem with the most efficient program they can come up with, then compare their program with the one offered in the next month's issue.

Most of the problems could come from the readers. They could be encouraged to send in programming problems—with the solution—to be published in the column.

Just to get the ball rolling, here are two problems and my solutions. There is almost always more than one solution, but I believe these are the most efficient.

Problem 1

Take a 4-digit number, such as 3025
Seperate it into halves, forming two 2-digit numbers 30 & 25
Add the two 2-digit numbers $30+25=55$
Square the sum $55^2=3025$
And end up with the original number.
Write a BASIC program that prints out all the 4-digit numbers for which this is true.

Problem 2

The following is an exercise in FOR-NEXT logic for beginners. Write a TI BASIC (not Extended BASIC) program that outputs the following, centered horizontally on the screen.

```
*********
 *******
  *****
   ***
    *
```

No fair using more than one print statement or more than one asterisk in the print statement.

Donald J. Beck
Seneca, IL

That's a good idea, Donald. Keep your eye out for an announcement in a future issue of the magazine. We think a feature like this would be valuable and stimulating. (Readers who tried their hand at solving these problems can compare their *solutions with the ones Donald sent in. They're on page 54.)*

Recursion Redivivus

Nobody would argue with Henry Gorman's general thesis (*99'er HCM*, May 1983) that LOGO is a lot more friendly than BASIC. But this surely begs the question of their respective intentions. It was no part of the original purpose of BASIC to be easy on the user, but rather to be easy to implement on the relatively slow computers of twenty years ago. Only in comparison with assembler could it be regarded as friendly, and even then the comparison is not totally one-sided; most common implementations of BASIC do not support symbolic statement labels, to name one area in which assembler wins.

Of course, there are many extended versions of BASIC, some fairly powerful, but this diversity merely adds to the difficulty of using the language. In truth, BASIC is not one language but hundreds, about the only common theme being the (usually optional nowadays) use of the superfluous word "LET"! This unfriendliness, together with the popular misconception that BASIC is meant to be easy, surely deters many from exploring higher level languages, and must be responsible for much of the computer-phobia which persists today.

However, I must jump to the defense of BASIC to take issue with Mr. Gorman's remarks about recursion. In common with most implementations, TI BASIC does not support subroutines, but is perfectly valid to perform a recursive "GOSUB". For example:

```
1000 INPUT I
1010 N=1
1020 GOSUB 1050
1030 PRINT N
1040 STOP
1050 IF I<12 THEN 1090
1060 N=N*I
1070 I=I-1
1080 GOSUB 1050
1090 RETURN
```

correctly calculates factorial N, though of course it probably isn't the fastest way.

More interesting examples mean you have to "push" and "pop" local variables to and from a stack, but this is not difficult; it is due to the fact that "GOSUB" is not a genuine subroutine facility, rather than because BASIC doesn't support recursion. I have successfully used recursion in TI BASIC for such classic purposes as evaluating game moves to an arbitrary depth. The only thing you cannot do is include a loop within the scope of the recursion. On its way back up the "chain" you will have to recover the loop variable from the stack, and when it hits the "NEXT" statement you will be rewarded with the reasonable but not very polite "CAN'T DO THAT" we all know so well!

Tony Welsh
Houston, TX

Thanks for the disquisition on recursion, Tony. A lot of readers will undoubtedly find this both illuminating and useful. As you correctly note, the BASIC interpreter places limits

Continued on p. 49

Entering 99'er Programs

New readers should be aware that within the magazine's pages are found actual computer programs that *you* can put into your Home Computer and enjoy.

Make sure you have any special system components required by the program (e.g., the Speech Synthesizer, Extended BASIC cartridge, etc.). Then, using the console keyboard, you can type the printed magazine listing (character for character, and line by line) into the computer's memory.

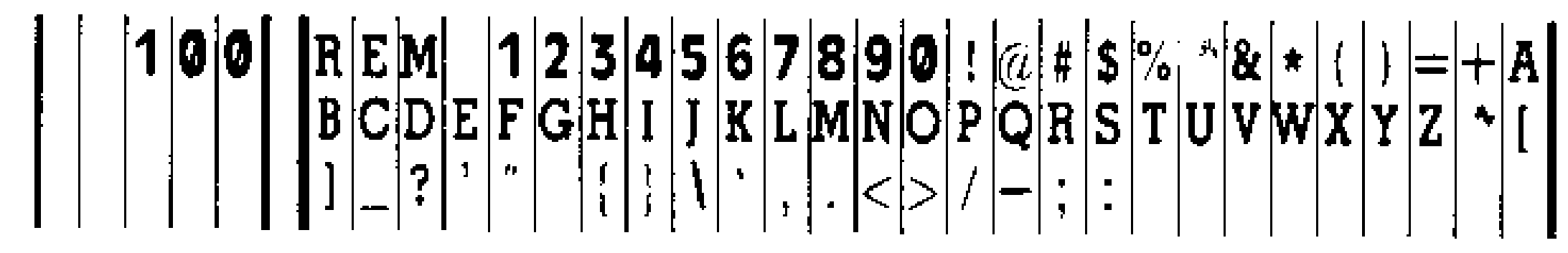
Before entering the program, connect a cassette recorder to the computer. Make sure you have two blank cassette tapes. For each 10-20 lines you type in, use SAVE CS1 to save that program segment onto one of the tapes. Alternate between the two tapes each time you save the program. Be sure to rewind to the beginning of each tape before saving, so that you always record over and replace the shorter segment of program lines with the longer segment. By following this procedure, you'll always retain most of your work even if the lights go out or someone turns off the computer.

Double check your typing against the program listing for errors, and *then* have someone else check it. The most common errors are typing the letter "O" instead of the number "0" (zero)—they are *not* interchangeable to the computer. This is also true for the letters "I" and "L" and number "1" (one). See "Key-In Reference"

Every time you make a correction to your program, SAVE CS1 and switch the tapes. Once all the errors are corrected, you will have a good copy of the program on the last tape. Before turning off the computer, put the other cassette tape in your recorder and once again SAVE CS1. Now, if one tape gets damaged, you won't have to enter the program listing via the keyboard all over again. Have fun and happy computing. 99'er

Programming Conventions

KEY-IN REFERENCE



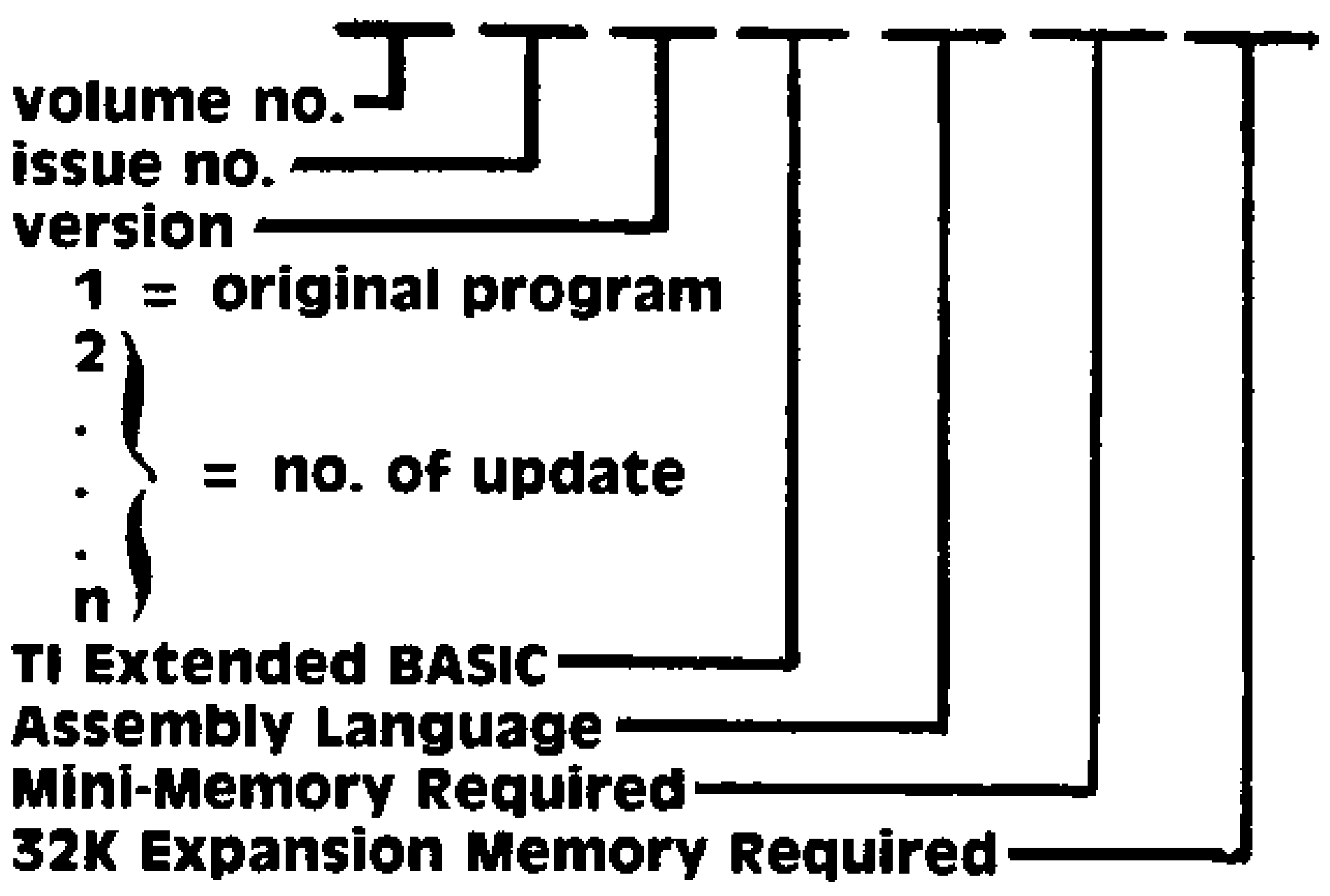
1 0 0
R E M 1 2 3 4 5 6 7 8 9 0 ! @ # $ % ^ & * ( ) = + A
B C D E F G H I J K L M N O P Q R S T U V W X Y Z ^ [
] _ ? ' " { } \ ` , . < > / — ; :

99'er **=End of Program or Article**

compu-prestidigitation

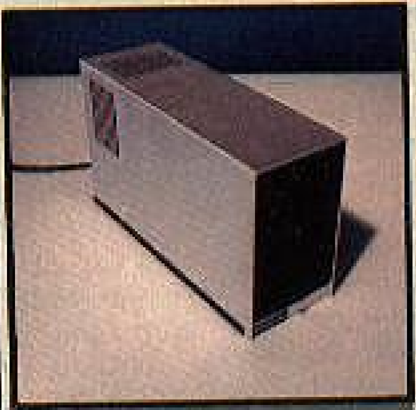
(kóm·pū·prĕś·teh·dĭ·jeh·tā́·shŭn) —*n.* **1.** The magical quality of unexpected comprehension that results from presenting technical information about computers in a lively, entertaining, visually attractive and easy-to-understand format. **2.** The magical tricks that make a computer sing, dance, and do all sorts of wonderfully useful things.

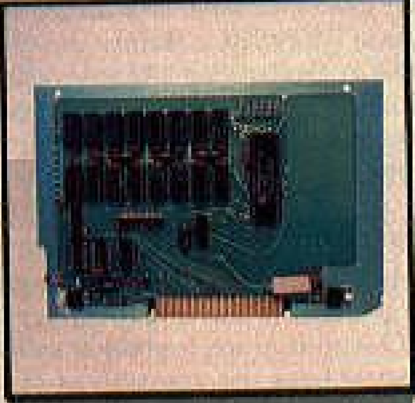
99'ER VERSION



PERIPHERAL

The choice in microcomputer peripherals keeps getting better all the time—helping you to get more out of your Home Computer. In this review feature, *99'er HCM* will look at new hardware products that we feel can expand our readers' peripheral vision.





32K Memory Card

Foundation
74 Claire Way
Tiburon, CA 94920
$50.00

32K Memory Expansion Card

Intellitec Computer Systems
2337 Bonanza Court
South Jordan, UT 84065
$130.00

Stand-Alone 32K Memory Expansion Module

Intellitec Computer Systems
2337 Bonanza Court
South Jordan, UT 84065
$220.00

Stand-Alone 32K Memory Expansion Module

Tachyon Systems
5125 South Westwind Way
Kearns, UT 84114
$110.00

Last week turned out to be "32K Memory Expansion Week" at the 99'er Peripheral Vision lab. All of a sudden, no fewer than four less-expensive alternatives to TI's 32K card were crowding our lab shelf. Some were in the form of accessory cards which fit into the Peripheral Expansion Box, and some were "stand alone" models designed to plug into the RS232 output port on the right side of the console.

The 32K Memory Expansion option is one of the more useful add-ons for your system, necessary for operating TI-WRITER, TI LOGO, the TI Editor/Assembler and larger Extended BASIC programs. Therefore, it should be considered as part of any step beyond console BASIC. Besides the obvious reasons for adding expansion memory—the ability to write larger programs or to use more complex systems—there are some factors which might not be so apparent. These deal with the system's configuration: the conglomeration of devices attached to it. The bare system (console and monitor) gives you about 14.5K bytes of usable space. If you add the Extended BASIC cartridge in order to take advantage of that language's power, you immediately lose some available memory: It drops to about 13.9K bytes. Adding a disk system reduces the available space to about 12.5K bytes because of the buffers necessary for the disk controller. Adding *both* Extended BASIC *and* a disk system reduces the available space to about 12K bytes. So you've gained considerable power, speed and flexibility, but have lost program space. The solution to this problem: memory expansion. Adding one of the 32K memory expansion devices approximately triples the usable program space, although the actual amount available depends on the system in use. When using the Editor/Assembler, for instance, you can access most of the 32K. With Extended BASIC, however, only about 24.5K bytes are available; the other space is taken up by Extended BASIC's utility routines.

This article is not intended to be a comprehensive survey of all the 32K memory expansion products, but it will give you some idea of what is available, and what to look for.

First of all, the good news is that we found all of the units we tested to be functionally equivalent to our benchmark, the Texas Instruments 32K Memory Expansion Card. But let us be quick to point out that mere performance is not the whole story. Durability and reliability are also very important and are not, unfortunately, so easily measured. And so we cannot make any recommendations or determinations about which units are "best values." We can only offer our subjective evaluation of construction and design quality on the assumption that the more carefully built products tend to give the most trouble-free service.

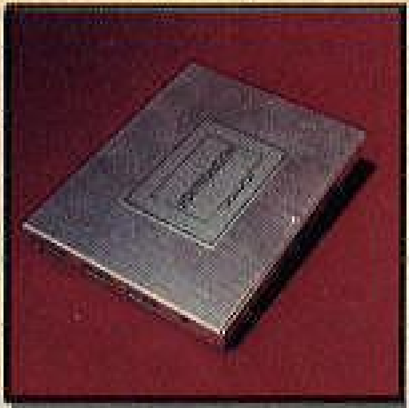
The 32K Cards

If you eventually plan to put together a flexible and powerful TI 994/A system, acquiring the Peripheral Expansion System (PES) is one way to do it. If you want to choose from the accessory cards that provide the 32K memory expansion, this component is a must, because their edge connectors are designed to plug into one of the slots in the expansion box.

The Foundation version, like the TI card, is enclosed in a sturdy brushed-aluminum case. Overall, the workmanship is state-of-the-art. Unfortunately, one aspect of this card's design caused us some concern. Unlike the TI card, the Foundation version has no tabs to fit into the slots intended to hold the accessory cards upright, which leaves it free to flop from side to side if the PES is moved around. This could result in weakening of the bus connections. Although this problem is potentially serious, most of the risk of damage can be eliminated by positioning the Foundation card between two secured aluminum-clad cards. Before moving the box around, it might be good to remove this card (if it's not supported) to avoid damage.

The version made by Intellitec is another well-constructed card. While it *does* slide into the supporting slots, it is *not* encased in a protective metal shield. Lack of a covering will not necessarily shorten the life of the Intellitec card, but it does leave

VISION 99



it more vulnerable to damage. When removing or replacing any unprotected card or any card in a slot adjacent to it, you should take extra care to avoid damaging it.

32K Add-on Boxes

You may also select the 32K option without investing in TI's Peripheral Expansion System. Several companies make a "stand alone" version for less than the suggested retail price of the Texas Instruments 32K card. The two that we examined require a separate power supply, and both came with cords and transformers from the manufacturers.

Besides its 32K Memory Expansion Card, Intellitec also makes a stand-alone version. Its flat black, painted case measures 8" by 6" by 2 3/4", and so does not match the lines of the console. (Of course, this in no way affects the unit's performance.) This model has a power toggle switch and power-on light.

Finally, we received a hand-built prototype 32K module from Tachyon Systems. This unit is very compact, measuring only 6" by 2" by 4" (the production model will be slightly smaller), and features a power switch and light. Since we have only a prototype to look at, we cannot make any judgments about the quality of the version that will be offered for sale.

All the 32K memory expansion devices we examined were functionally equivalent to one another and to the TI Memory Expansion Card. The choice you make among them, therefore, depends upon other considerations: cost, present state of your system, and intended further purchases.—*Will Schick*

TX-99™ Disk Drive System

Percom Data Corporation
11220 Pagemill Road
Dallas, Texas 75243
$449.00

Many of you who have purchased the basic TI-994/A system (console, TV set and cassette player for program storage) may be wondering what the next logical step is in upgrading your system. Naturally, this depends on your own particular needs, but it is hard to imagine any peripheral adding more power to your system than a disk drive. Maybe it's because diskettes only cost about $3 each that we tend to take for granted the remarkable technological advance embodied in this 5 1/4" wonder. With one drive using single-sided, single-density disks, over 90,000 bytes of information are almost instantly available. Millions of bytes stored off-line take up no more space than a shoebox, and can be accessed almost as fast as you can pop the diskettes in and out of the drive. After you get used to accessing and transfering data in seconds, you will probably be calling the slower, more clumsy cassette medium "stone age" technology.

It is understandable that someone who is on a tight budget, but eager to upgrade his system would not be eager to buy the TI Peripheral Expansion Box. After all, the PEB doesn't do anything by itself; its only purpose is to make expansion of the system possible. Although the PEB may be a good investment for some, you can still put together a pretty good system without it. You can get an RS232 interface for your printer and a 32K memory expansion unit (see above); add a few additional Command Cartridges, and you'll have a versatile set of computing tools at your fingertips.

Although hooking components together "freight-train" style can quickly get out of hand, it can make economic sense as more complete peripheral packages become available. The Percom Data TX-99 disk drive system is one such complete package. The system includes the disk drive itself, the disk controller (which is usually on an accessory card within the PEB), a *Disk Manager 2* Command Cartridge, two pre-initialized disks, a ribbon connecting cable, and two user manuals. Percom Data also offers a package that does not include the *Disk Manager 2* cartridge. The drive and controller are housed in a very sturdy 7.2" X 4.8" X 11.7" cabinet of brushed aluminum weighing just over 8 1/2 lbs. More of the 5 1/4" single-sided, single-density diskettes are widely available.

The TX-99 manual explains how to attach the disk drive to your console and how to store and retrieve files using BASIC commands. Because the disk controller is contained in the unit, set-up is very easy. With the ribbon cable included, simply connect the TX-99 to the expansion port located on the right side of the console and it is ready to accept a diskette. It can also be plugged into the expansion port of a peripheral already plugged in. In any case, the TX-99 has to be the last in line in the freight train, because nothing can plug into its connector. (If you wish, you can easily add another drive later on.) A lever holds the floppy in place while in use, and ejects it when turned to the verticle position.

Although the TX-99 comes with pre-initialized disks, and you can order more from Percom, you can also initialize your own disks if you have the *Disk Manager 2* Command Cartridge. Disks must be initialized before use; initialization divides the disk's storage area into sectors, and marks the boundaries between sectors. This permits the controller to find and access files in a matter of seconds.

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Modulation.......Frequency shift-keyed (FSK)
Line Interface..................Direct-connect
Data Interface.TI RS-232C compatible, built-in cable to computer
Transmit Frequency...........ORIG. . ANSW. . .
MARK 1270 Hz 2225 Hz
SPACE 1070 Hz 2025 Hz
Transmit Frequency Accuracy......... ±0.01%

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Receive Frequency..............ORIG . . ANSW
MARK 2225 Hz 1270 Hz
SPACE 2025 Hz 1070 Hz
Receive Frequency Tolerance.......... ±0.5%
Carrier Detect Threshold.......-44 dbm typical
Carrier Detect Indicator..........Audible tone
Power RequirementInternal 9V transistor battery.* or 110 VAC through adapter*
Size..................8 1/4" × 4 3/8" × 1 3/8"
*Not included

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Finally, we should mention that the TX-99 is one of the quietest floppy disk drives we've ever used, and one of the most attractive.—*Will Schick*

CompuTech Speedkey

CompuTech Distributing
209 E. Walnut
Springfield, MO 65805
$169.95 with software support disk

Business programmers using the TI-99/4A may be interested in a new accessory, the new CompuTech Speedkey. The list price of $169.95 includes a 25-key pad and a disk containing the software necessary to drive the system. The pad, which plugs into the joystick port, can be accessed through Extended BASIC, Assembler, or Mini Memory. Besides the ten numeric keys, there are five programmable function keys, and the more customary keys such as ENTER, ERASE, "Y" and "N," BACKSPACE and FORWARD. The keys are wide, smooth and comfortable—a good quality pad.

The advantage of a keypad for quick data entry is clear, but buying the Speedkey makes sense only if you have the skill to integrate its support Assembly Language routines into your software, or if you buy the software products that already have the Speedkey routines integrated.

Our Speedkey system was a demonstration model which included no operation manual. Guided by the demonstration software's screen displays and menu selections, we were, however, quickly able to create and update a sample account file.

By making good use of the five programmable function keys and the other non-numeric keys, your hand may rarely leave the Speedkey. "Y" and "N" allow quick menu selection; the direction keys aid in editing; the period, minus sign and slash are common math symbols; and ENTER and ERASE are probably the most widely used keys of all.

Even more handy are the five programmable keys. On the demonstration version, you are presented with default values for these keys and can choose to replace those values with any string of up to 127 characters or any keys on the standard keyboard. Instead of typing long names or commands over and over, you can simply press a single key. With clever use of these capabilities, you can get a lot of speed out of the Speedkey.

—*Will Schick*

Texas Light Shooter

NOT-POLYOPTICS
13721 Lynn Street, Suite 15
Woodbridge, Virginia 22191
$30.00

The Texas Light Shooter from Not-Polyoptics can provide you with another dimension for your computer games. The photoreceptor cell in the Light Shooter sends a signal through the joystick port when it's exposed to a light-colored patch on the screen. In the games that come as a part of the package with the Light Shooter, you have to track moving objects across the screen and trip the Light Shooter's photoreceptor when you're right over them. This sort of action lends itself to a number of games which depend on hand-eye coordination that is limited to the dimensions of the screen.

The Light Shooter seemed to be not very sensitive at times. Holding it right against the screen, we could trip its sensor any number of times over a target, and it still would not read that target. Part of the insensitivity, though, may be in the logic of the game program. Loops that require the program to read external devices can be notoriously insensitive if there's a lot of program code other than the required to read the external device in the loop.

For some people, the form of the Light Shooter may bring up a moral question—it is in the shape of a revolver, complete with moving hammer which, however, has no functional connection with the device. Perhaps the choice of shape was dictated by the economies inherent in using existing parts (the plastic gun shell); perhaps by the connection to Texas and the Old West. But there certainly are a myriad of other shapes that could have been chosen that are not loaded with potentially controversial associations.—*Robert Ackerman*

The "Widget" Cartridge Expander Board

Navarone Industries
210 Lawrence Expressway #800
Sunnyvale, CA 94086
$49.95

If you find yourself often changing command cartridges, or hunting around for misplaced cartridges, you may be interested in Navarone's Module Switch. Also known as the "Widget," this simple device plugs directly into the cartridge slot of the TI-99/4A console and has rubber feet to protect the surface of the console from scratches. It accepts up to three different cartridges at a time, selectable by switch. A reset button allows you to choose among the cartridges without turning the console on or off.

With a TI-WRITER, a Disk Manager and an Extended BASIC cartridge always in place, about 90% of my module swapping would be eliminated. Although the "Widget" detracts from the streamlined appearance of the TI-99/4A console, it does add to the streamlining of its function. Some programmers may find the convenience to be worth the extra expense.—*Will Schick*

Epson FX-80 Dot Matrix Printer

Epson America, Inc.
Computer Products Division
3415 Kashiwa Street
Torrance, CA 90505
$699.00 with Parallel Interface
$809.00 with Serial Interface
$ 14.95 Ribbon Cartridge

NOTE: The cable you use to connect the FX-80 parallel port to the TI parallel port must connect FX-80 pin 11 to TI pin 10, and FX-80 pin 16 to TI pin 11. If your cable is not configured this way at present, it must be modified.

For some time now, microcomputer owners have faced the dilemma: Whether to buy a printer now, or wait a while and get something better for a lower price? If you've been waiting for a fast and versatile dot matrix printer to appear in the medium price range, maybe you've waited long enough.

Epson's new FX-80, which lists for about $700, offers a variety of features remarkable in a printer at any price. The design philosophy seems to have been to try to give you everything a dot matrix printer can offer, plus a little bit more. At 160 characters per second (bi-directional and logic seeking, of course), it is faster than many of the more expensive models. Many printers feature dual-density graphics; the FX-80 goes a step further with a quadruple-density option. It can fine-tune line spacing to a hair-splitting 1/216 of an inch. It can use fanfold, roll, and single sheet paper. The high density 9×9 matrix produces as crisp a line of text as any printer of this type. The FX-80 provides proportional spacing (similar to this typset page, rather than to typewriter text)—a *must* for producing more appealing "correspondence quality" print (see box). The twelve formating commands can accomplish almost any page layout, and different scripts—even those you create yourself—can be printed on the same line.

The list of features goes on: Printing may be in condensed, emphasized, double-strike, italic, 10 and 12 character per inch, enlarged (5 cpi), underlined, superscript and subscript modes. Many of these can be used in combination, giving scores of distinctly different print faces. The FX-80 also allows you to select half-speed printing (80 cps) to dampen the noise of 160 cps and to improve the resolution of the print.

Perhaps the most intriguing feature of the FX-80 is the option it provides to create your own character sets. With this, you can render the Russian, Hebrew, Japanese or Arabic ASCII characters. Electrical engineers can print some of their special symbols, or scholars can design a set of Old English or some other style of print.

I decided to try my hand at a Greek character set because those letters are so popular with mathematicians. Since I had

Continued on p. 44

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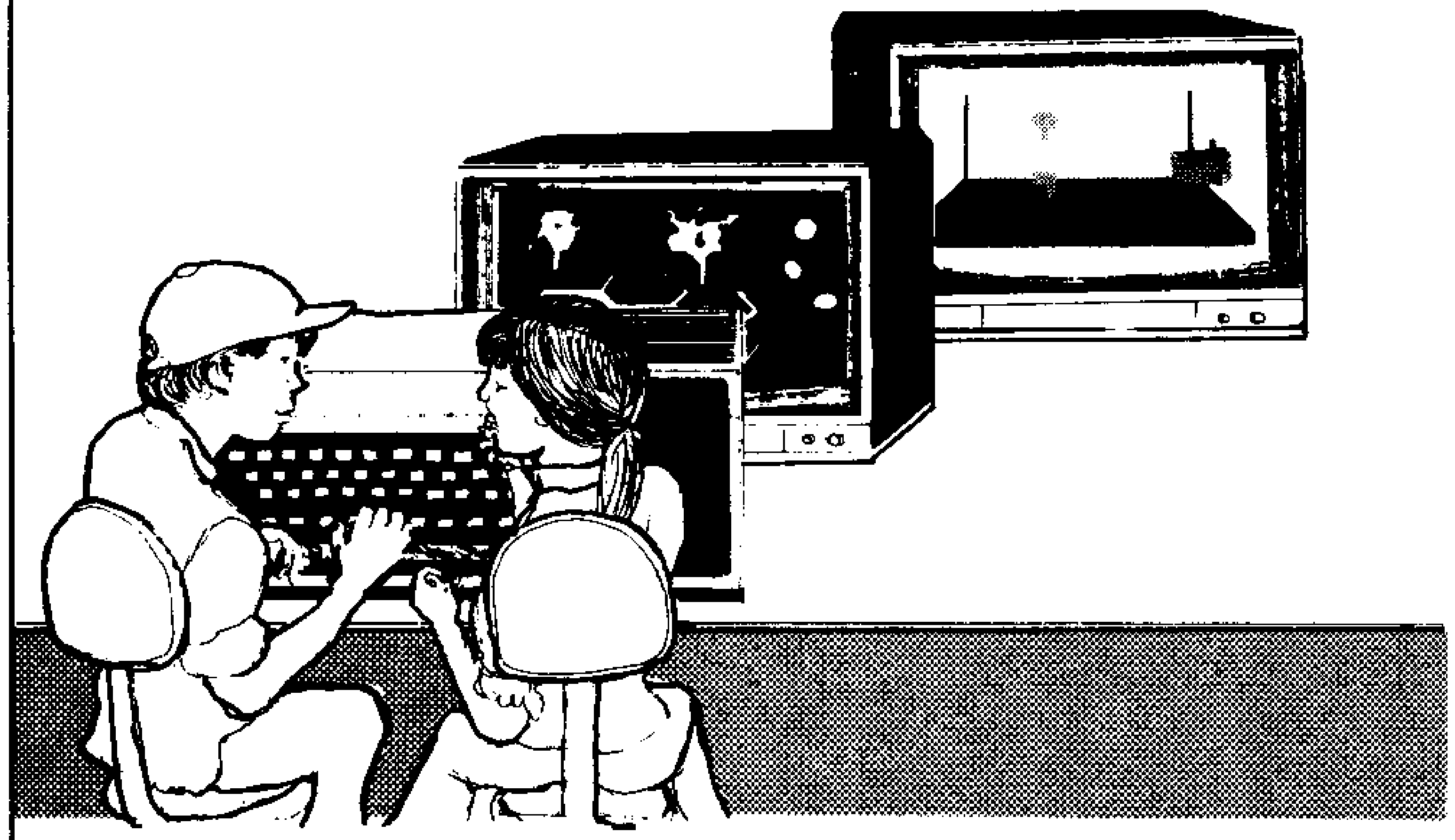

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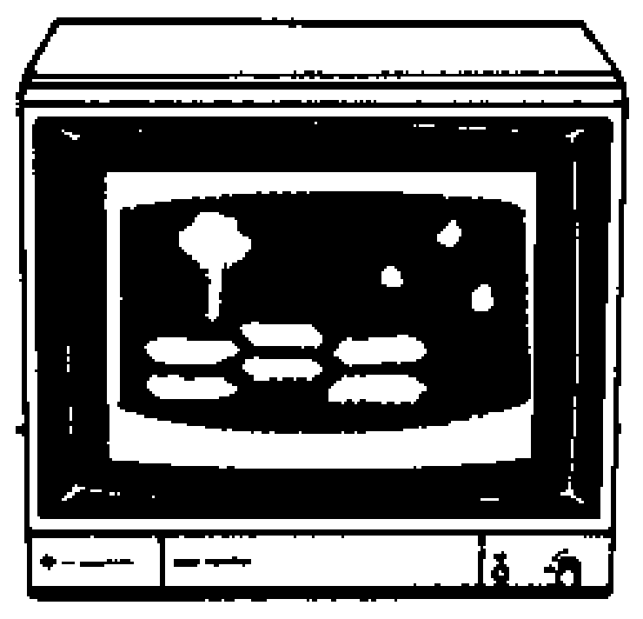

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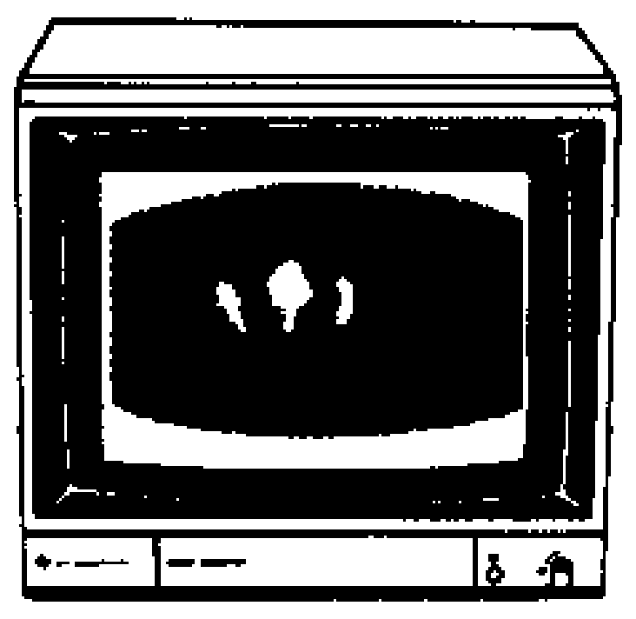

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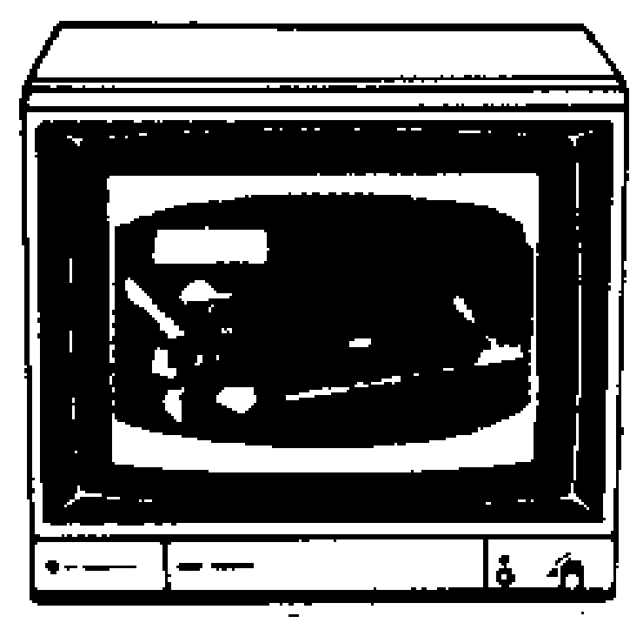

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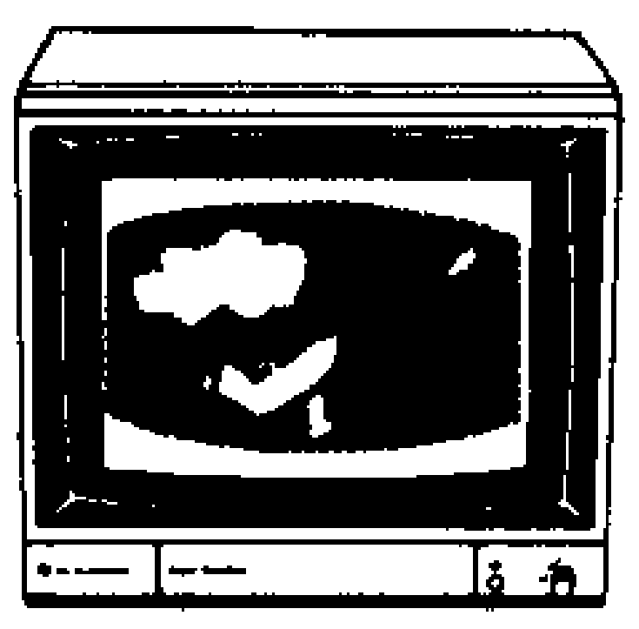

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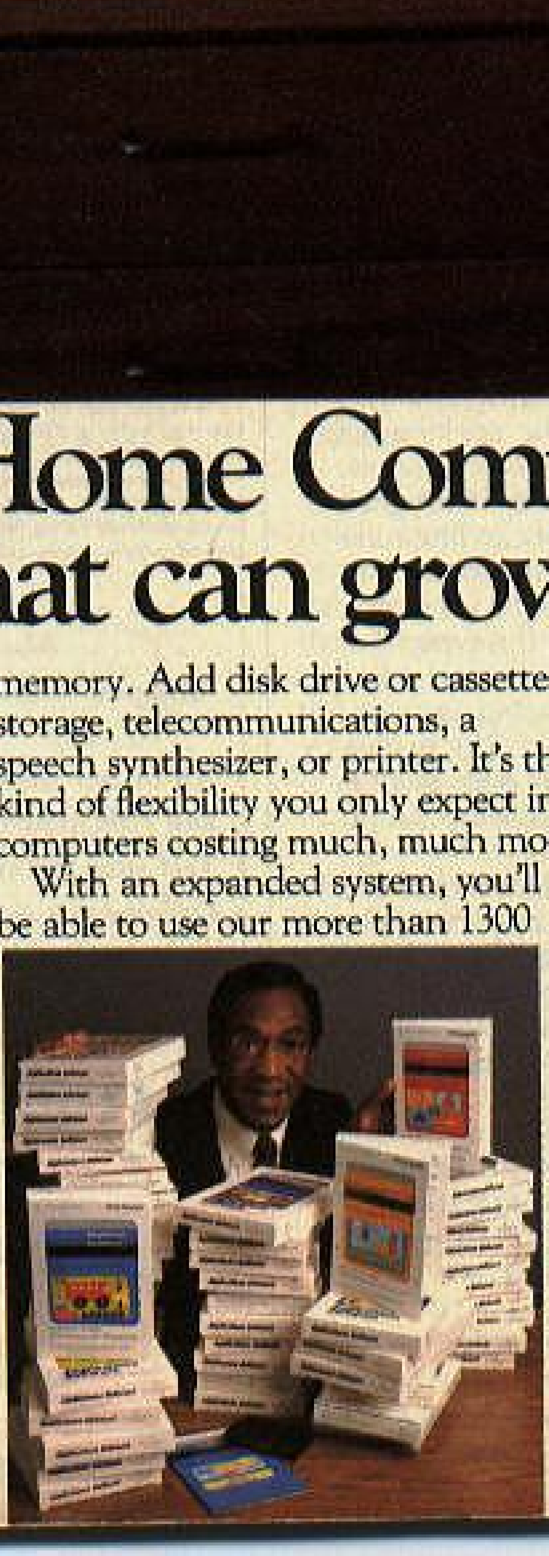

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4. What category of articles do you enjoy the most? ☐BASIC programming tutorials ☐System tutorials ☐Photo features & news items ☐Game programs ☐Education programs ☐Utility programs ☐Product reviews ☐LOGO articles
5. How much total time do you spend with each issue? ☐Less than 2 hours ☐2-4 hours ☐5-7 hours ☐8-10 hours ☐11-13 hours ☐over 14 hours
6. How many other computer-related magazines do you currently read? ☐None ☐1 ☐2-4 ☐5 or more
7. Are you ☐Male ☐Female ☐Under 16 years of age ☐16-20 ☐21-25 ☐26-30 ☐31-35 ☐36-40 ☐41-50 ☐over 50
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10. What is your ZIP code? ☐☐☐☐☐

FOR READERS WHO DON'T YET HAVE A TI COMPUTER

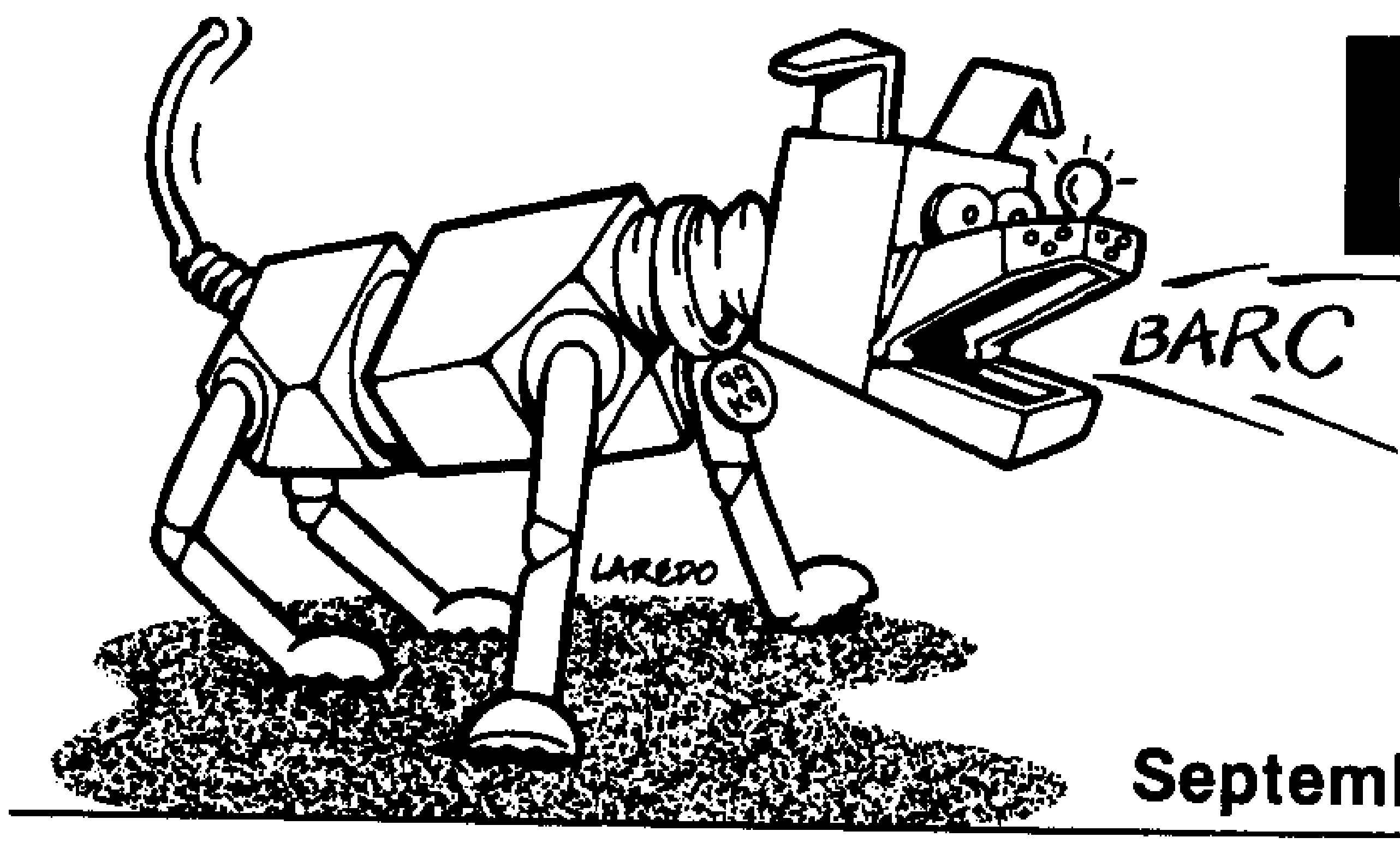
1. Do you intend to buy a TI computer? ☐No ☐Yes (within 3 months) ☐Yes (within 3-6 months) ☐Yes (within 6-12 months)
2. Which do you think you'll purchase? ☐TI-99/4A Home Computer ☐Compact Computer 40
3. What do you anticipate your primary use of a TI computer will be? ☐Entertainment ☐Education ☐Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use

FOR PRESENT TEXAS INSTRUMENTS COMPUTER USERS

1. Which system(s) do you currently own? ☐99/4 ☐99/4A ☐CC-40
2. What was your primary reason for buying it? ☐Entertainment ☐Education ☐ Computer literacy ☐Household management ☐Job-related homework ☐Business ☐Professional use
3. What was your primary reason for buying the Texas Instruments brand? ☐Company name/reputation ☐Features for the money ☐16-bit microprocessor ☐Convinced by friends/relatives ☐Ease of use ☐Prior use in course or "Advantage Club"
4. Which additional TI computer are you likely to purchase within the next 6 months? ☐None ☐99/4A ☐CC-40
5. What peripherals do you currently use? ☐Cassette recorder ☐Disk controller & drive(s) ☐Peripheral Expansion Box ☐RS232 ☐32K Memory Expansion ☐TV ☐B/W monitor ☐Color Monitor ☐Speech Synthesizer ☐Joysticks ☐Printer ☐Modem ☐p-Code Card ☐Hex-bus Adapter ☐Wafertape Drive
6. Put a CIRCLE around the above peripheral you are most likely to buy within the next 6 months.
7. Mark all TI language software you own or plan to buy within 6 months. ☐Extended BASIC ☐99/4A Editor/Assembler ☐UCSD Pascal ☐LOGO ☐Forth ☐Mini Memory ☐Pilot ☐CC-40 Editor/Assembler
8. How much money do you expect to spend within the next 12 months on your computer system?

Software	☐None	☐less than $30	☐$30-50	☐$51-100	☐$101-250	☐over $250
Peripherals	☐None	☐less than $50	☐$50-100	☐$101-250	☐$251-500	☐over $500
Books	☐None	☐less than $10	☐$10-25	☐$26-50	☐over $50	
Blank tapes & disks	☐None	☐less than $15	☐$15-35	☐$36-75	☐over $75	
Furniture, dust covers, & accessories . . .	☐None	☐less than $25	☐$25-100	☐over $100		

9. How many software CARTRIDGES do you expect to purchase within the next 12 months? ☐None ☐1-3 ☐4-7 ☐8-12 ☐over 12
10. What % of the above CARTRIDGES will be for entertainment? ☐0% ☐less than 25% ☐25-50% ☐51-75% ☐76-100%
11. Circle above what % of the CARTRIDGES will be for education.
12. Have you purchased from any of our advertisers in the magazine within the last 6 months? ☐No ☐Yes, Software ☐Yes, Peripherals ☐Yes, Books ☐Yes, Blank tapes & disks ☐Yes, Furniture, dust covers & accessories
13. About how much money have you spent on the above purchases? ☐less than $25 ☐$25-50 ☐$51-100 ☐$101-250 ☐$251-500 ☐$501-1000 ☐over $1000
14. On the average, about how many program listings in each issue do you key into your computer and use? ☐None ☐1 ☐2 or 3 ☐4 or more



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sunrise

By S.T. Holl
8215 Clifton Farm Ct., Alexandria, VA 22306

Hello again, dynascape painter! From your *chip*per appearance, I'd say you've been basking in the glory of your BASIC sunrise all month! Now you look ready for a bright new challenge on your horizon. If you followed our BASIC painting in August and you have an Extended BASIC cartridge, you can now invoke its powers to create an even more exquisite dynascape. First, you'll need to plug in the Extended BASIC cartridge and load in the program you saved last month or, key in the complete program from the listing that appears at the end of this article. There. Now that your palette is ready, let's see what patterns this language can add to our sunrise.

In the embellishment to follow, we'll put scenery in front of the sunrise. By reversing the usual operation of sprites we can make them hold still while the screen display moves behind them.

```
190 GOSUB 630
630 CALL MAGNIFY(4)
640 RANDOMIZE
650 CALL CHAR(140,"FFFFFDF1
    E1E1FFC1")
660 CALL CHAR(141,"C1C1C1C1
    FFFFFFFF")
670 CALL CHAR(142,"FFFFBF8F
    8787FF83")
680 CALL CHAR(143,"83838383F
    FFFFFFF")
```

So far we have added the subroutine call, arranged for the sprites to cover 16 blocks instead of a single block each, and have defined four characters which will take the shape of a portion of a building. We have also included RANDOMIZE because it is more interesting if the city behind which the sun rises is different each time we run the program.

Sunrise in the City

Now we will enter the mechanism which builds the city. The plan is to have five foundations on which our building blocks can be placed, and to place blocks on foundations at random until ten have been sited. Since sprite locations are based on the pixel instead of the row, the numbers are larger, by a factor of eight, than those we've been using so far. The pattern of their layout, however, is the same—(0,0) is in the upper left hand corner of the screen, and upward is in the "minus" direction—hence the subtraction in line 740 below.

Here are the foundations:

```
690 FOR I=1 TO 5
700 SKYLINE(I)=185
710 NEXT I
```

and here we build the city:

```
720 FOR SP=1 to 10
730 I=INT(1+RND*5)
740 SKYLINE(I)=SKYLINE(I)-32
750 CALL SPRITE(#SP,140,2,SKY
    LINE(I),32+32*I)
760 NEXT SP
850 RETURN
```

Finally, the Fauna

We haven't used up all of our sprites, so let's add a bit of wildlife to the picture. Here is one way to do that. The keying in isn't as hard as it looks, particularly if you learn how to use the REDO command to repeat similar looking lines such as the ones between 770 and 840. [After entering a line you'd like to repeat in an almost identical form, press [FCTN] [8]. This will cause the last line entered to reappear on the screen, with the cursor over the leftmost digit of the line number. You can now alter the line number, then the rest of the line and enter it. This function makes it much easier to enter similar lines—especially tedious ones like character definitions.—Ed.]

```
770 CALL CHAR(132,"00000000
    00000080")
780 CALL CHAR(133,"63080800
    01000000")
790 CALL CHAR(134,"00000000
    00000080")
800 CALL CHAR(135,"00000000
    01C61010")
810 CALL CHAR(136,"00000000
    00000000")
820 CALL CHAR(137,"00140000
    00000000")
830 CALL CHAR(138,"00000000
    00000000")
840 CALL CHAR(139,"00000000
    00000000")
860 IF DARK-12*INT(DARK/12)
    <>2 THEN RETURN
870 WC=WC+1 ::UP=-2-RND
    *8 ::RT=-15+RND*30
880 CALL SPRITE(#WC,132,2,161,
    83,UP,RT)
890 CALL SPRITE(#WC+7,136,7,
    161,83+RT/4,UP,RT)
900 RETURN
```

We also need another subroutine call to invoke the lines starting at 860:

```
290 GOSUB 860
```

and we need to modify lines 150 and 160 yet again to initiate the wildlife counter WC.

```
150 DATA 32,42,2,3,88,6,0,0,0,10
160 READ SKY,STAR,FGC,CHSET,
    SUN,SUNRISE,SUNHI,ONN,OFF,
    WC
```

I shall not tell you what type of creatures we have added with this final segment of code; that is a surprise! I will mention, though, that the "+RT/4" in the fifth argument of the sprite call on line 890 is a crucial element. Without it, the creatures' bodies fly away from their eyes! As the sun rises high and the wildlife begins to stir, sit back and marvel that every sunrise, pocket or otherwise, is truly unique.

Continued on p. 14

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```
100 REM ****************
110 REM * POCKET SUNRISE *
120 REM ****************
130 REM  BY S.T.HOLL
140 REM 99'ER VERSION 2.11.1YB
150 DATA 32,42,2,3,88,6,0,0,0,1
0
160 READ SKY,STAR,FGC,CHSET,SUN
,SUNRISE,SUNHI,ONN,OFF,WC
170 CALL CLEAR
180 CALL SCREEN(2)
190 GOSUB 630
200 CALL COLOR(1,2,2)
210 CALL COLOR(2,16,2)
220 CALL COLOR(8,11,11)
230 FG$="FFFFFFFFFFFFFFFF"
240 BG$="0000000000000000"
250 FOR DARK=1 TO 50
260 CALL HCHAR(23,1,SKY,32)
270 CALL HCHAR(23,RND*30+1,STAR
,1)
280 PRINT :
290 GOSUB 860
300 GOSUB 600
310 NEXT DARK
320 BGC=FGC
330 DATA 15,9,11,4,5,6,6,6,6,0
340 READ FGC
350 IF FGC<>0 THEN 370
360 GO TO 360
370 CHSET=CHSET+1
380 IF CHSET<7 THEN 400
390 CHSET=2
400 CALL COLOR(CHSET,FGC,BGC)
410 IF FGC<>SUNRISE THEN 430
420 ONN=1
430 FOR EIGHTH=1 TO 8
440 PATTERN$=SEG$(FG$,1,2*EIGHT
H)&SEG$(BG$,1,2*(8-EIGHTH))
450 SKY=(CHSET+3)*8+EIGHTH-1
460 CALL CHAR(SKY,PATTERN$)
470 CALL HCHAR(23,1,SKY,32)
480 IF OFF+(1-ONN)THEN 560
490 SUNHI=SUNHI+1
500 SWIDE=SUNHI
510 IF SWIDE<5 THEN 530
520 SWIDE=9-SWIDE
530 CALL HCHAR(23,17-SWIDE,SUN,
2*SWIDE)
540 IF SUNHI<8 THEN 560
550 OFF=1
560 PRINT :
570 GOSUB 600
580 NEXT EIGHTH
590 GO TO 320
600 FOR TICK=1 TO 10
610 NEXT TICK
620 RETURN
630 CALL MAGNIFY(4)
640 RANDOMIZE
650 CALL CHAR(140,"FFFFFDF1E1E1
FFC1")
660 CALL CHAR(141,"C1C1C1C1FFFF
FFFF")
670 CALL CHAR(142,"FFFFBF8F8787
FF83")
680 CALL CHAR(143,"838383 83FFFF
FFFF")
690 FOR I=1 TO 5
700 SKYLINE(I)=185
710 NEXT I
720 FOR SP=1 TO 10
730 I=INT(1+RND*5)
740 SKYLINE(I)=SKYLINE(I)-32
750 CALL SPRITE(#SP,140,2,SKYLI
NE(I),32+32*I)
760 NEXT SP
770 CALL CHAR(132,"000000000000
0080")
780 CALL CHAR(133,"630808000100
0000")
790 CALL CHAR(134,"000000000000
0080")
800 CALL CHAR(135,"0000000001C6
1010")
810 CALL CHAR(136,"000000000000
0000")
820 CALL CHAR(137,"001400000000
0000")
830 CALL CHAR(138,"000000000000
0000")
840 CALL CHAR(139,"000000000000
2800")
850 RETURN
860 IF DARK-12*INT(DARK/12)<>2
THEN RETURN
870 WC=WC+1 :: UP=-2-RND*8 :: R
T=-15+RND*30
880 CALL SPRITE(#WC,132,2,161,8
3,UP,RT)
890 CALL SPRITE(#WC+7,136,7,161
,83+RT/4,UP,RT)
900 RETURN
```

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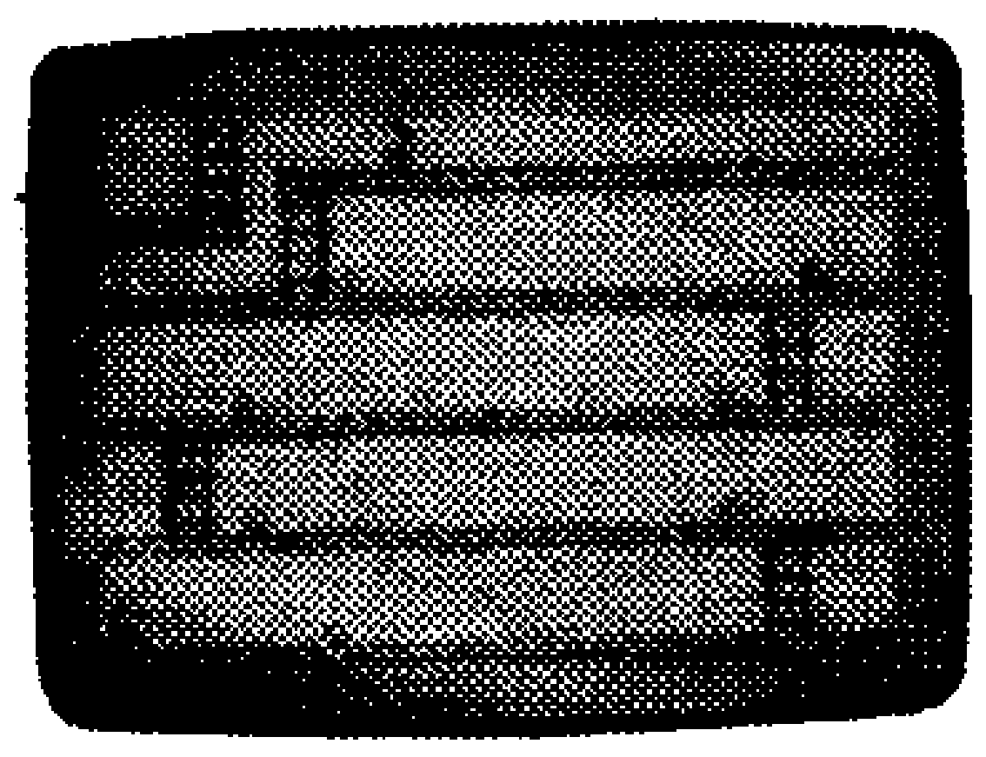

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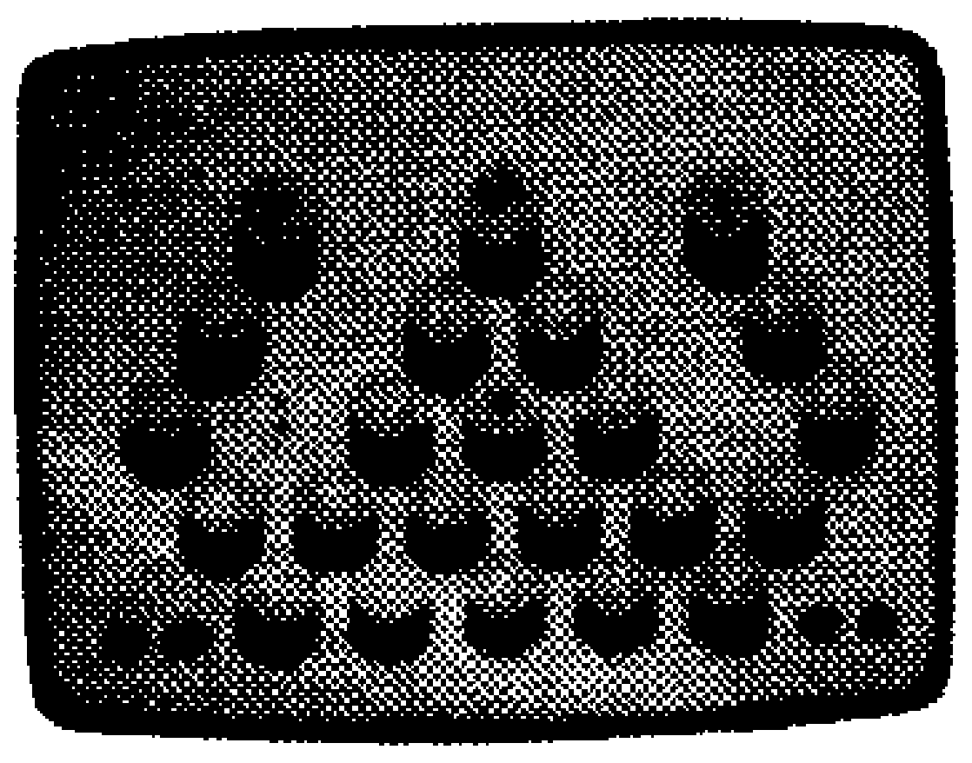

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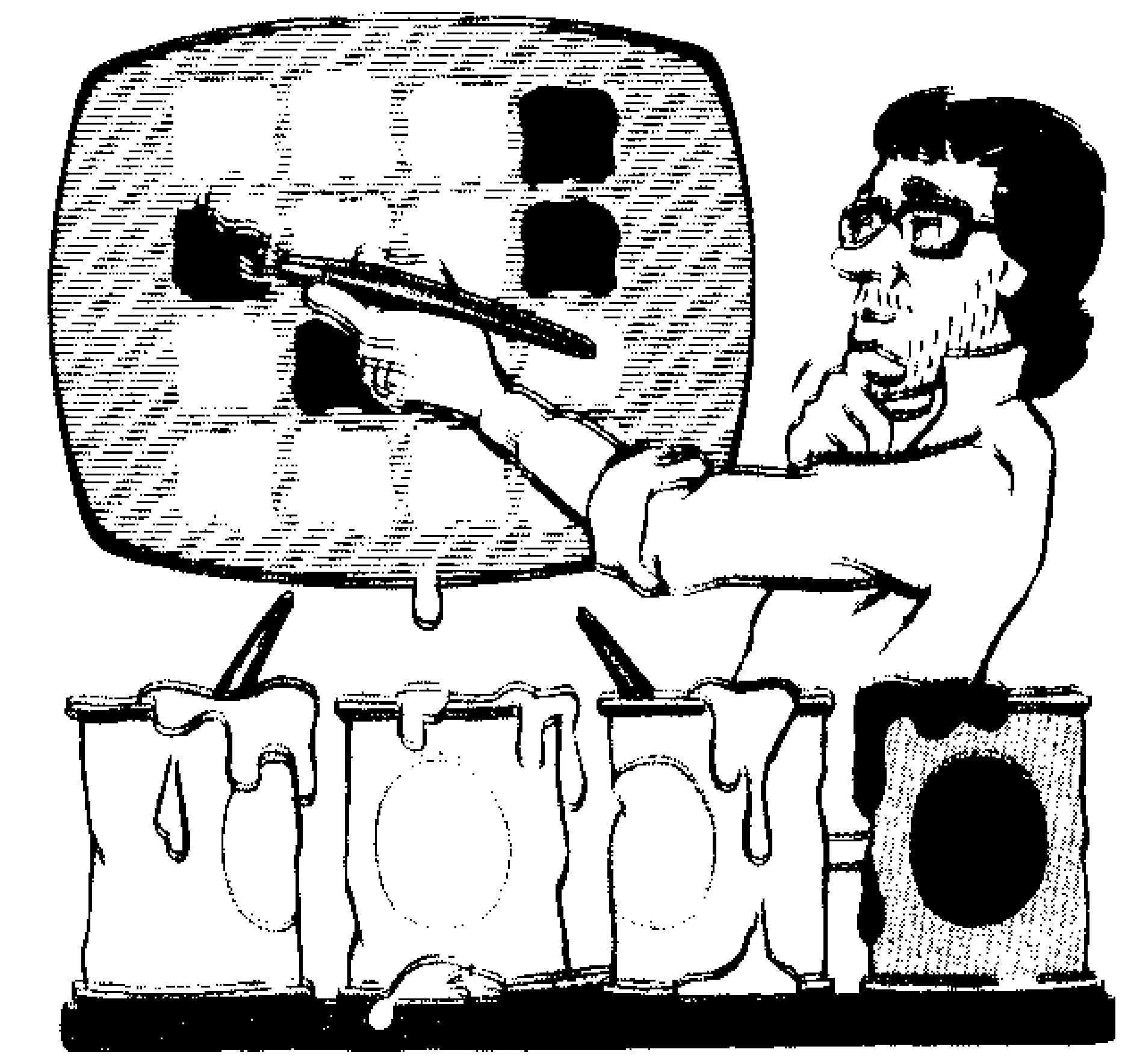

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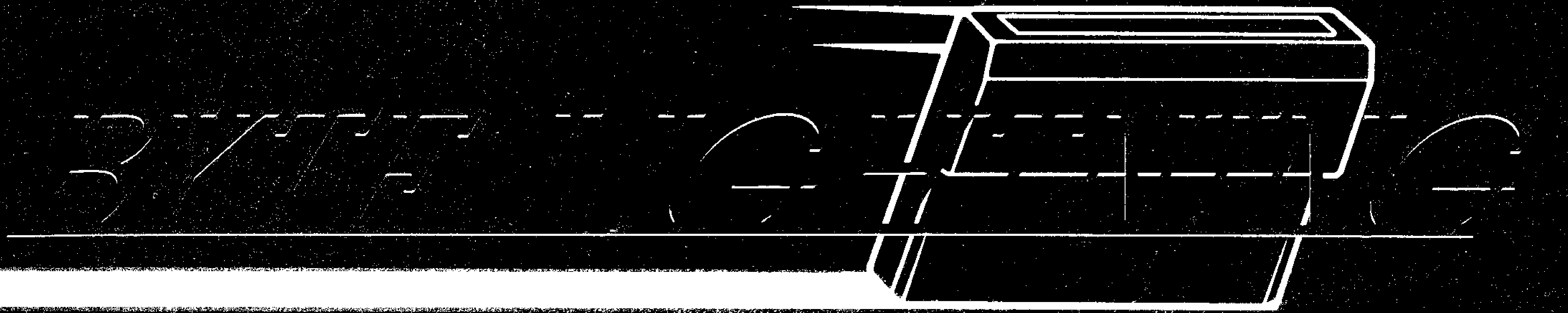

James R. Dew
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The Mini Memory Command Cartridge offers exciting and useful advantages to owners of the 99/4 and 4A computers. For a minimum system (console and tape cassette), it offers a low-cost way of adding high-speed file storage, extensions to TI BASIC, and Assembly Language. This article focuses on a very small part of the Mini Memory capability—describing how it can be used to create an arcade-style game that is faster than most of the games written in TI BASIC or Extended BASIC.

When the Mini Memory cartridge is inserted into a 99/4A computer, the programming capability of TI BASIC is enhanced to include several new types of CALL statements.It would take an enormous article to describe all of the additional capabilities which are provided and how to use them. This article will deal with only two of the new CALL statements—CALL PEEKV and CALL POKEV—which allow a TI BASIC program to read from and write to the VDP RAM. To make sense out of these capabilities, you need to understand the internal workings of the VDP RAM and why it is worthwhile to read from or write to it directly.

RAM is an acronym for Random Access Memory, which means computer memory that can be changed. The computer's processor, sometimes called a Central Processing Unit or CPU, reads instructions and data from either the RAM or another kind of memory called ROM (Read Only Memory). But the processor can only write into RAM.

The TI computer is organized slightly differently from other machines: It has two processors and 2 kinds of RAM. One processor is the TMS9900, the famous 16-bit microprocessor that serves as the computer's CPU. The other processor is known as the Video Display Processor or VDP. The VDP has its own RAM called the VDP RAM. This RAM contains data which controls the computer displays. It is also this RAM that can be accessed by the PEEKV and POKEV CALLs.

Screen Maps

The VDP contains 16K bytes of data. The first 768 bytes make up a Screen Map, which determines what is being displayed on the monitor. The display contains 24 lines of 32 characters, making 768 characters in all. Each character on the screen is controlled by one byte in one Screen Map, giving 768 bytes in one Screen Map. Before looking at ways to access the Screen Map with PEEKV and POKEV, we should examine why we would want to do such a thing in the first place! After all, the standard TI BASIC CALL HCHAR and VCHAR allow us to place things on the screen in any fashion we choose, so why worry about Screen Maps?

The answer is simply *speed*. When using HCHAR (or VCHAR or PRINT), the computer must do a lot of work to calculate the correct Screen Map address, validate the legality of the command, and perform the other housekeeping chores necessary to keep the internals of TI BASIC working correctly. None of this is needed when the VDP RAM is accessed directly. Because there is less work to do, the job gets done faster.

This difference in speed is hard to appreciate until you see it in action. To illustrate this, I am including the complete program listing of a game called *Light Race* in this article. *Light Race* is an arcade game that is faster than any TI BASIC game could be without using the direct VDP RAM access capability of the Mini Memory cartridge.

The VDP Screen Map is addressed in *Light Race* as bytes number 0 through 767. To place a character on the screen in the upper left hand corner, you would use the following statement:

CALL POKEV(0,*char-number*)

Note the two parameters in the CALL statement. The first is the address of the VDP RAM (in this case, address zero), and the second is the value to be stored in the Screen Map byte. Therefore, to place an A in the upper lefthand corner of the screen, you would use the following statement:

CALL POKEV(0,161)

But wait! The character code for A is 65! Where did the 161 come from?

A complete answer to this question would be too complicated for this article, but a simple explanation is that character numbers in the Screen Map are different from those in TI BASIC. In fact, each of the Screen Map character numbers is exactly 96 more than the TI BASIC numbers. Thus, since a normal Basic A is 65, a Screen Map A is 65+96 or 161. All of the TI BASIC displayable characters must be increased by a value of 96 when using direct Screen Map display.

Byte Representation

So far, we've seen that displaying a character in the upper lefthand corner of the screen isn't too difficult. But what about the rest of the screen? Happily, the Screen Map is organized in a very simple way. The bytes in the Screen Map represent the display screen in left to right, top to bottom order. This means that byte 0 contains the upper left-hand corner character, byte 1 contains the character immediately adjacent and to the right, byte 2 contains the next character, and so on. The second line on the screen starts at byte 32, the third line starts with byte 64, and so on.

But the best part is yet to come! POKEV allows the programmer to deposit multiple bytes in the Screen Map in a single statement. The general format of the statement is:

CALL POKEV(*address,value1,value2,. . . .*)

where *value1* is placed in the VDP RAM byte at *address*, *value2* is placed at *address+1*, and so on.

Now let's examine part of the *Light Race* program. Lines 1570 through 1590 use POKEV to display a title screen. Multiple values are used to display words on the screen. If you are familiar with Extended BASIC, you might recognize a similarity in these statements and Extended BASIC's DISPLAY AT statement. But the POKEV approach is faster: The title screen for *Light Race* actually appears to come on the screen instantaneously!

POKEV is even more flexible than we've indicated so far. Line 1650 in the program shows the use of POKEV with *two* different addresses. The double quote parameter indicates that the next parameter is not another value but a new address. The general form of POKEV is

CALL POKEV(*address1,value1,value2 , . . . "",address2,valuex,valuex+1, . . .*)

Just using what's been described so far will

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let you "soup up" many TI BASIC programs. But there are even more useful techniques used in *Light Race*.

The PEEKV statement allows a program to read the VDP RAM. In *Light Race*, PEEKV is used to read the Screen Map (see line 930). PEEKV is analogous to GCHAR in much the same way that POKEV is analogous to HCHAR. The general form of PEEKV is

CALL PEEKV(*address1,variable1,variable1, . . . '''',address2,variablex,variablex + 1*)

As with POKEV, the reason for using PEEKV instead of GCHAR is speed. In *Light Race*, PEEKV and POKEV are used to control moving graphics on the screen. Normally, you could do the same thing more easily with GCHAR and HCHAR because the screen position is specified by using Y and X coordinates in GCHAR and HCHAR statements. When using POKEV and PEEKV to access the Screen Map, the programmer must *compute* the appropriate Screen Map address for controlling the display.

It is easy to see that moving a character to the right with HCHAR requires adding 1 to the X value, moving to the left requires subtracting 1 from the X value, moving up requires subtracting one from the Y value, and moving down requires adding 1 to the Y value. When directly accessing the Screen Map, you must change the Screen Map address being accessed. Moving left and right is easy: It requires adding +1 or −1 to the current Screen Map address. Moving up and down is just as easy: that requires adding +32 or −32 to the current address.

In *Light Race*, motion is determined by keyboard or joystick input. Based on the output, the arrays A (for keyboard) or J (for joystick) are accessed to determine the change to the current Screen Map address. This change value is maintained in variable D (see lines 850 and 910). The change (D) is added to the Screen Map address of the current location (L) to compute the new address (N). Then both the old and new addresses are changed with a single POKEV statement. See lines 920 and 940.

Changing Colors

So far, we have only described ways of manipulating the Screen Map table. *Light Race* uses a second VDP RAM table for high-speed operation. The second table, called the Color Table, determines the colors of the character sets. In TI BASIC, the CALL COLOR command is used to manipulate the VDP RAM Color Table. But POKEV can be used to change the colors much more quickly, especially when several character sets are being changed at once.

Byte 784 contains the color for character set 1, byte 785 contains the color for set 2, and so on. Line 1570 contains a POKEV statement which sets up the Color Table. But what are those values and how do they relate to the values we know for the CALL COLOR statement?

Once again, the complete answer is too long for this article. But here is a short answer: If F is the desired foreground color and B is the background color, then the byte must be set to (F−1)*16+B−1.

Three Lightning-Fast Versions

Computers and computer systems are a lot like onions—if you peel away the outer layer, there's another layer underneath and you've still got an onion in your hand. The outer layers of a computer are the high-level languages that most of us normally use: the operating system commands (SAVE or OLD, for instance), or the programming languages (TI BASIC, Extended BASIC, LOGO, etc.). When we write a statement or a program in one of those languages, we don't know *exactly* which memory cells the program accesses, or the precise values it needs to put in a memory cell. In computer jargon, that information is *transparent* to us: We never see it.

Yet for all that these high-level languages do to ease our problem-solving, there is an associated cost. Often if can be speed, as the author of *Light Race* points out. While we as programmers simply have to write CALL HCHAR(1,12,32,5) to put blanks in part of a row, the TI BASIC interpreter has to compute locations in the Screen Map and then fill them. And this is where we can peel away one layer of the onion—finding underneath it the Mini Memory utilities that directly access specific memory locations in the computer. To use them effectively, of course, we have know which locations we want to change and what values we can put in them. The operations are no longer transparent. (There are, however, more layers to the onion beneath this one.)

There are other means, besides the Mini Memory cartridge, for accessing memory cells directly, and all of them require some knowledge of the computer's internal organization. TI Extended BASIC, for instance, has the ability to call up Asssembly Language subprograms when it is used in conjunction with a memory expansion device. CALL INIT prepares the memory expansion to receive the subprogram, CALL LOAD puts the subprogram in memory and CALL LINK provides the BASIC program with a name it can use to run the subprogram. The more complex a program's game action, the more worthwhile the use of Assembly Language subprograms become in terms of game speed. Think, for example, of controlling a large number of sprites at once. (For information about programming sprites, see "Programming Sprites in Mini Memory," *99'er HCM*, April 1983.) These Assembly Language subprograms—of limited scope and length, and integrated into the framework of an Extended BASIC program—can readily be written using the Mini Memory's Line-By-Line Assembler, or another of the Editor/Assemblers on the market. Most of the computer's operation remains transparent.

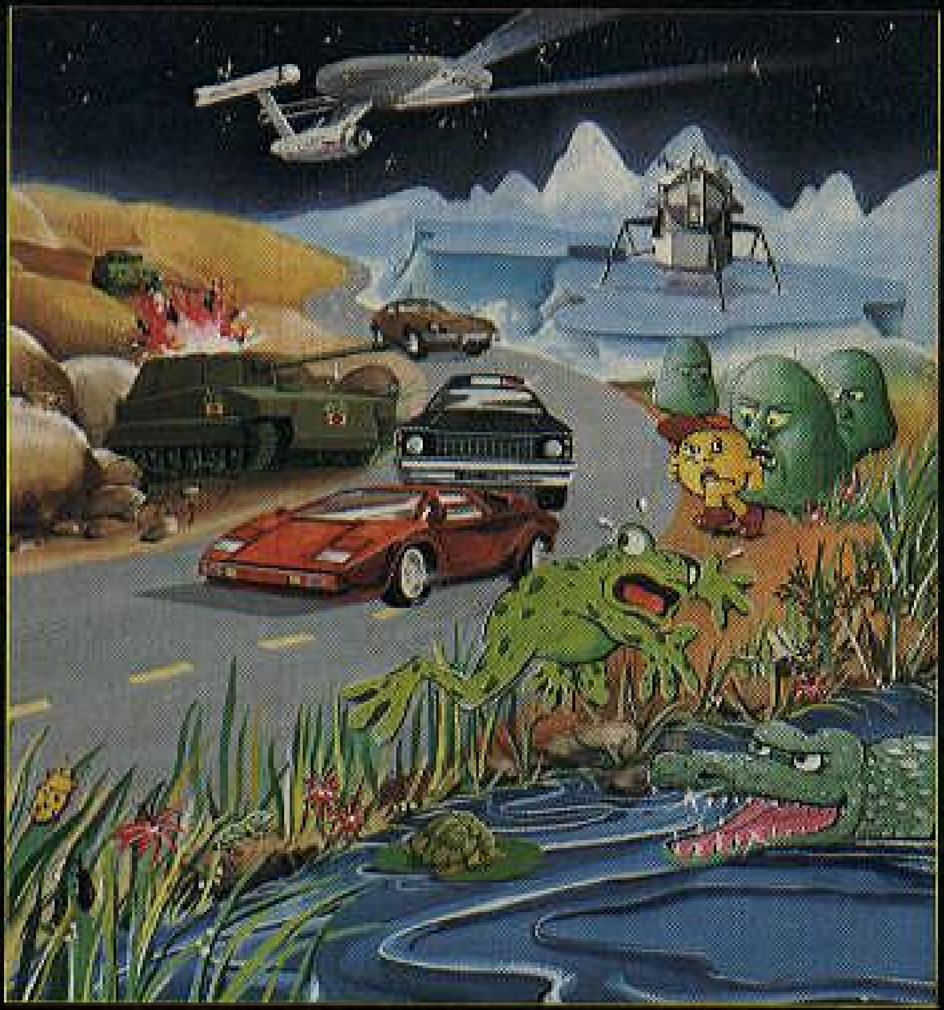
There is still another layer to peel off the onion. If you want maximum speed and flexibility, then you can use the TI Editor/Assembler to develop an entire program in Assembly Language. This demands a thorough understanding of the computer's internal organization, and will require considerably more programming effort. At this stage, it might seem that nothing remains transparent, that you have to control everything. Compared with the previous state, that's true. There are still more layers to this onion, though. Although learning Assembly Language may seem a formidable task at the outset, it is still manageable—see "Magic Crayon: Learning Assembly Language The Hard Way," *99'er HCM*, Volume 1, Number 6) for one novice's account of his conquest.

Assembly Language also has definite advantages. Patricia Swift wrote two programs (*99'er HCM*, "Super Language," June/July 1982) which implemented a well-known simulation called *Life*. In this simulation, cells on the monitor screen are filled with an initial pattern. Each succeeding generation fills cells with new members or empties cells of old ones, depending on the state of its neighboring cells. The Assembly Language version passes through many generations and reaches a repetitive state in about a minute; the BASIC version takes about two and a half minutes just to put the *second* generation on the screen. Assembly Language's speed also affords other advantages—sprite coincidence checks, for instance. In the same article, Swift wrote two other programs to demonstrate the difference in sprite coincidence checks. Again Assembly Language shows a much quicker response: It responds while the sprites are still in contact; in the Extended BASIC version, the sprites have already moved noticeably apart before it notes the coincidence.

Peeling the onion, getting at the internals of the computer through Assembly Language, may bring a few tears to your eyes—in this case, of frustration at first—but it certainly adds some zip to your stew.—*Robert Ackerman*

So far, this article has presented a lot of technical information. But all work and no play makes the TI a dull computer, so let's examine the game itself. The premise of *Light Race* is similar to a popular science fiction movie whose theme concerns life inside a computer. In *Light Race*, you control a high-speed light racer which streaks across the screen, heading for disaster. You are surrounded by four walls which you must not hit. In the opposite wall, there is a hole through which you must steer your racer to safety (or at least the chance for another try). To complicate matters, you must not hit the trail left by your own light racer.

As the game progresses, your racer appears on the screen at various locations requiring different directions to safety. In progressive rounds of play, obstacles appear on the playfield. Of course, you must



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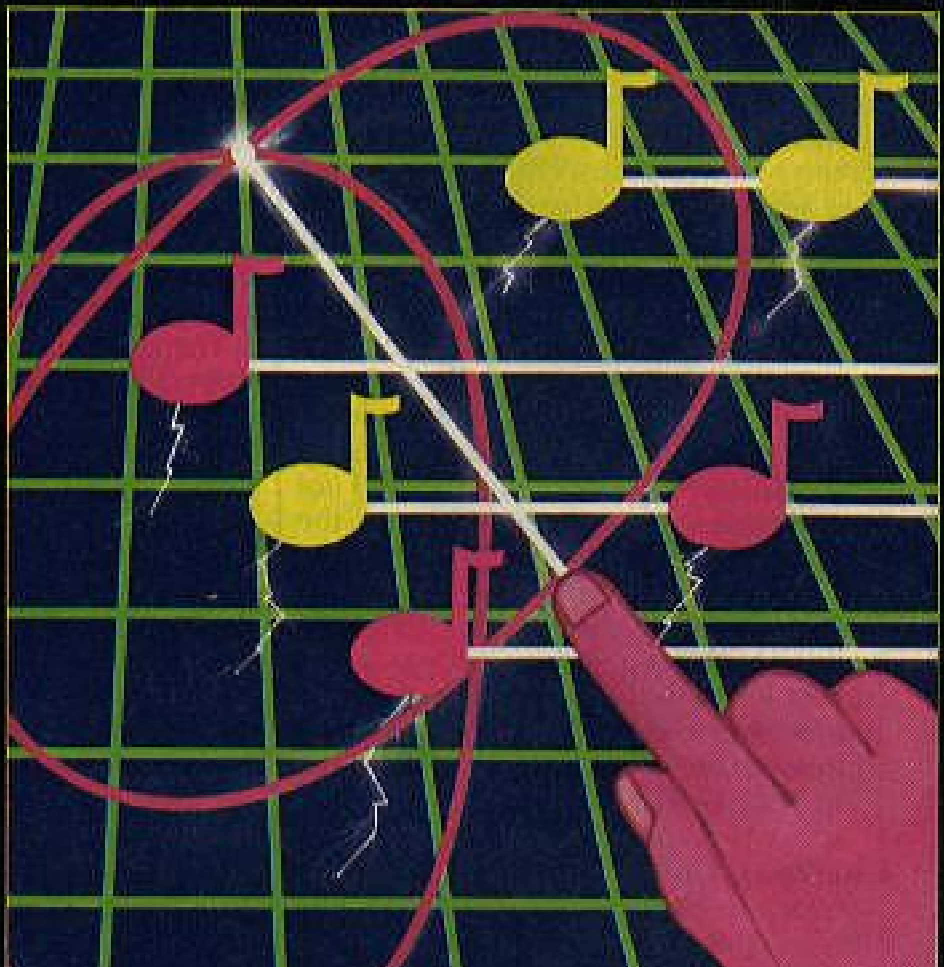

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not hit the obstacles either. As the game progresses, the number of obstacles increases. *Light Race* may be played with either joystick or keyboard input.

I hope that this article has whetted your appetite for a Mini Memory cartridge if you don't already have one. If you do, I hope this article has provided some useful information for taking advantage of the module, as well as a very unusual high-speed graphics game. This all goes to demonstrate that the Mini Memory is one of the best buys around for upgrading the capabilities of your TI-99/4 Home Computer.

Light Race
Explanation of the Program

Line Nos.	
100-170	Program header.
180-220	Initializes game.
230-290	Prints game instructions.
300-360	Sets game up for keyboard or joysticks.
370-390	Sets initial screen.
400-440	Defines data for keyboard and joystick movement routines.
450-460	Defines grid character and color.
470-720	Sets up four different game scenarios.
730-790	Sets up obstacles.
800	Chooses keyboard or joystick routine.
810-860	Reads keyboard.
870-910	Reads joystick.
920-980	Changes racer's direction and determines if it has crashed or reached its goal.
990-1030	Displays disaster message.
1040-1050	Sets new high score.
1060-1140	Asks for replay or end of game.
1150-1180	Increases score and returns for new scenario.
1190	Goes to message for successful completion of all five levels.
1200	Replays same level.
1210-1290	Ends level zero and resets level counter (OB).
1300-1320	Resets grid character (32) and replays.
1330-1390	Displays winning message.
1400-1490	Subroutine to display and erase score.
1500-1710	Defines characters and sets up title screen.
1720	Calculates score for each level.
1730-1880	Subroutine to display score.
1890-1930	Subroutine to fill in screen edge with grid.
1940-1980	Subroutine to fill in screen edge with blanks.

```
100 REM  **************
110 REM  * LIGHT RACE *
120 REM  **************
130 REM
140 REM   BY J. R. DEW
150 REM   99'ER VERSION 2.11.1M
    M
160 REM
170 REM  REQUIRES MINI-MEMORY M
    ODULE
180 RANDOMIZE
190 DEF RI(N)=INT(RND*N)
200 SC=0
210 HSC=0
220 GOTO 1500
230 PRINT "THIS IS LIGHTRACE.":
    :"IN THIS GAME, YOU ARE":"D
    RIVING A LIGHT RACER BUT":"
    YOU CANNOT CONTROL THE"
240 PRINT "SPEED. AHEAD OF YOU
    IS A":"BLACK WALL. THERE IS
     A RED":"HOLE IN THE BLACK
    WALL-YOU"
250 PRINT "MUST DRIVE YOUR RACE
    R":"THROUGH THE RED HOLE &
    TO":"SAFETY. IF YOU HIT THE
     BLACK"
260 PRINT "WALL OR YOUR OWN TRA
    IL, YOU DIE!"::"SELECT KEYB
    OARD OR JOYSTICKS BY TOUCHIN
    G K OR J KEY"::::
270 CALL CHAR(96,X$)
280 CALL COLOR(9,15,15)
290 GOSUB 1940
300 CALL KEY(0,JS,S)
310 IF JS*S=0 THEN 300
320 IF JS=74 THEN 370
```

Continued on p. 41

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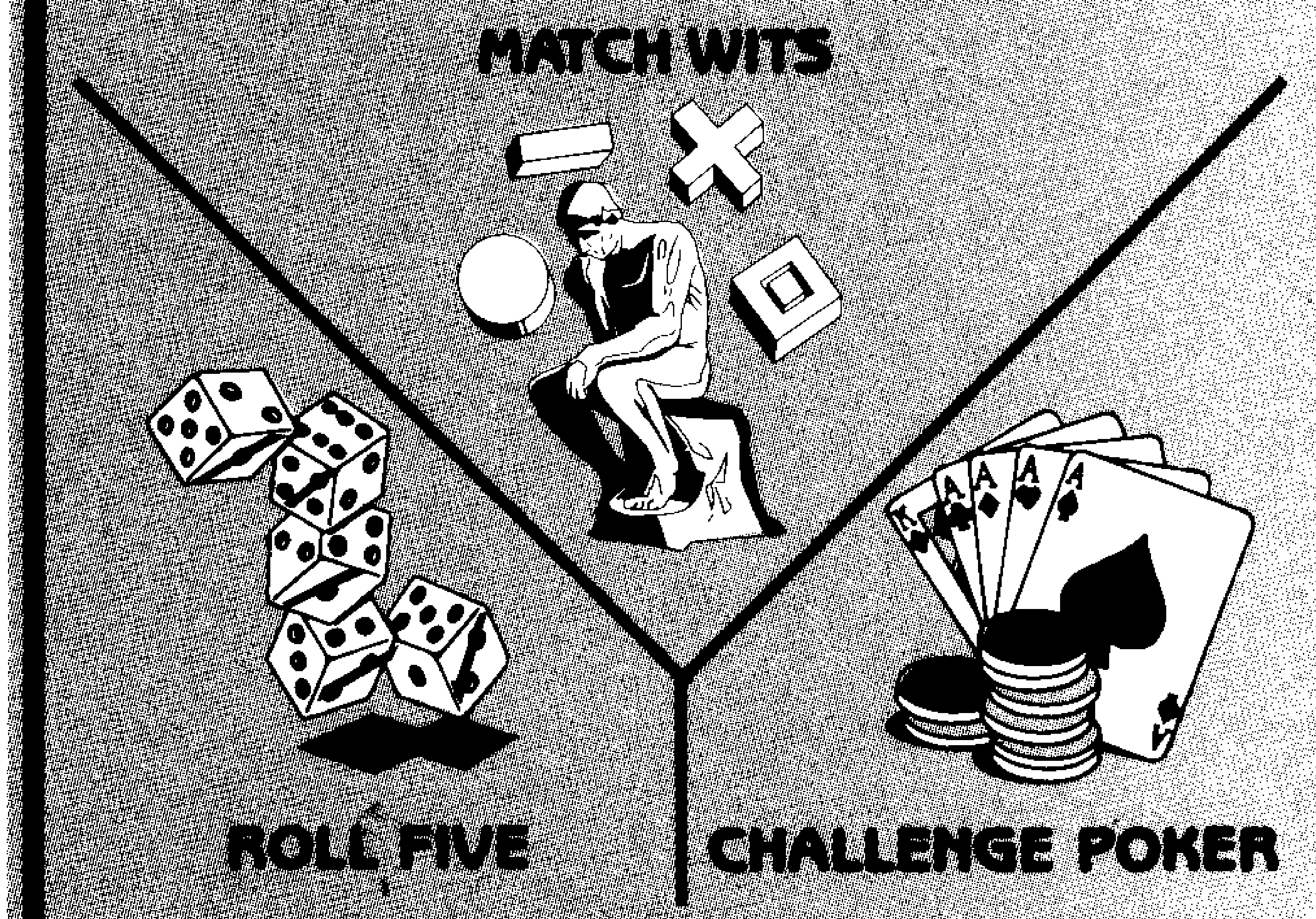

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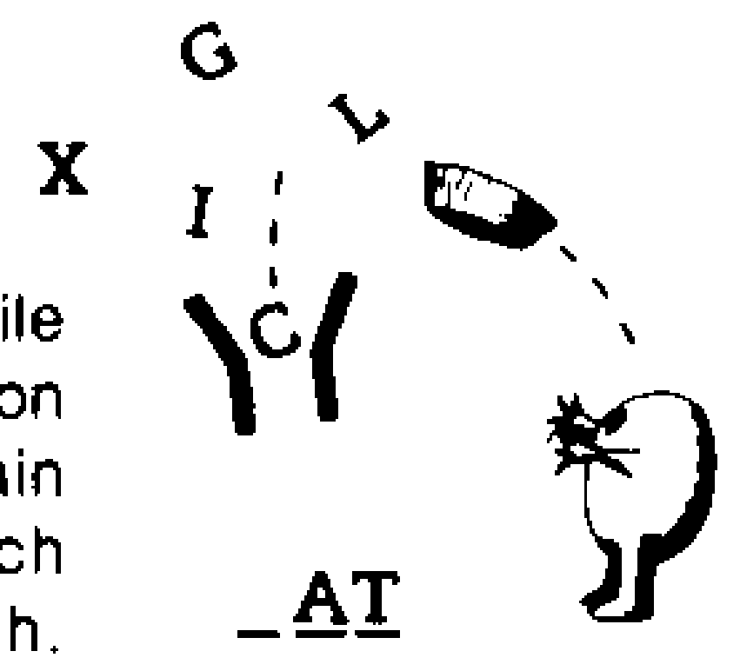

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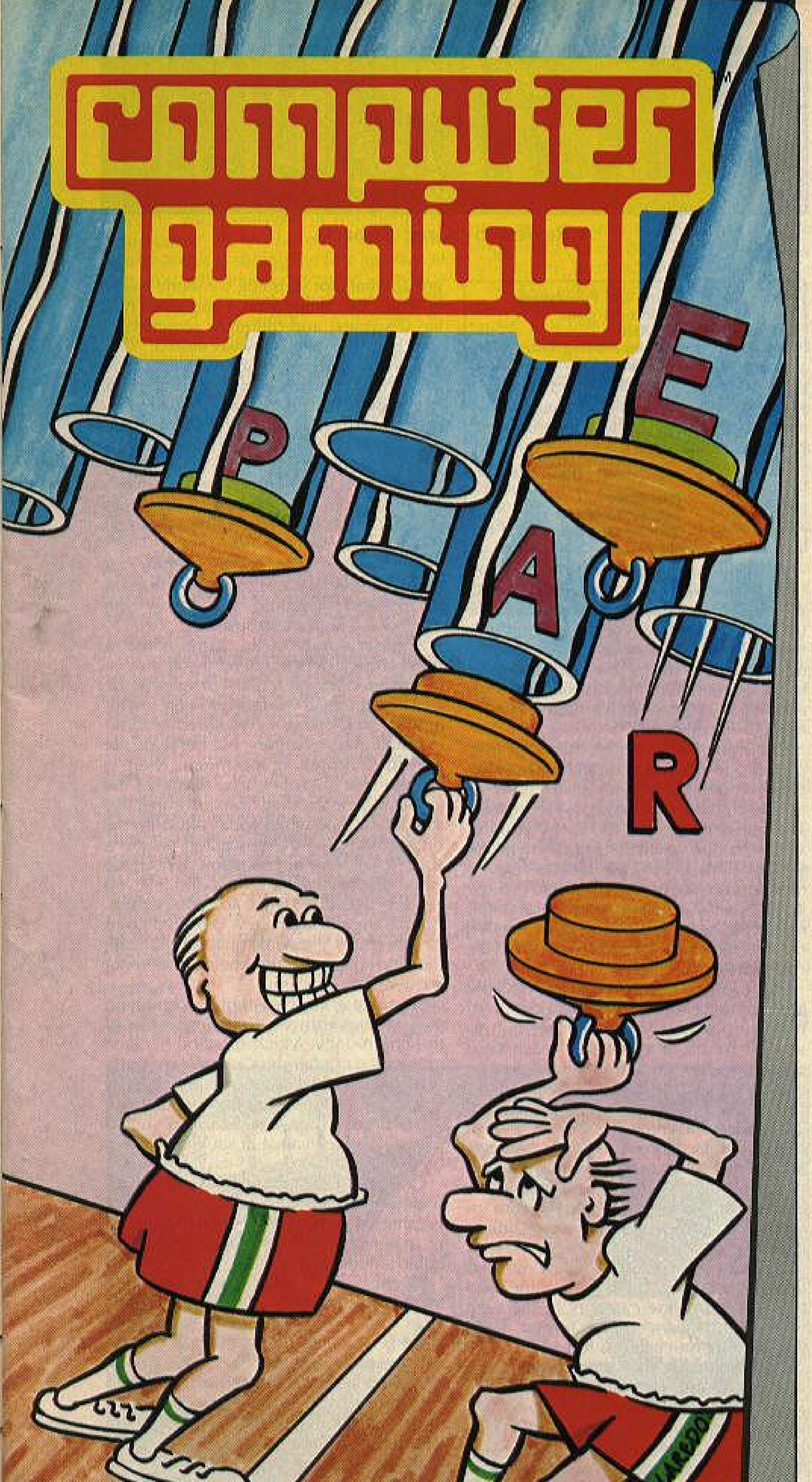


Brain Drain

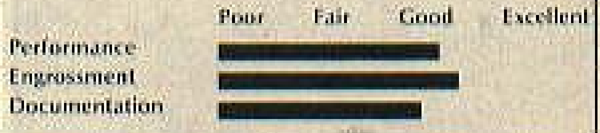
A Review of Nit-Wit

By Judy Sanoian

99'er HCM Staff

Name:	Nit-Wit
Program Type:	Word game
Language:	Extended BASIC
Distributor:	TEXware Associates 350 First North St. Wellington, IL 60973
Price:	$16.95 cassette.

System Requirements:
- Cassette Recorder
- Extended BASIC
- Joysticks



When you look at a Pontiac, do you immediately see the word *caption*? Do you mentally transform Pepsi Cola into *Episcopal*? If you're good at anagrams or *Scrabble*, you'll probably excel at *Nit-Wit*, a word game from TEXware Associates.

The object of the game is to capture quick-scrolling letters as they fall down drainpipes and form them into words of up to six letters each.This is not, in itself, too difficult, but you must do it more quickly then your opponent, who has the power to disable your predator-drain plug.

The game is actually a lot more like the box game *Boggle* than *Scrabble*. You are limited to the same six letters as your opponent, and there is a similar time element—you must form the word first, or you don't score. There is also the added challenge of manipulating your drain plug to fit exactly into the drain. This is no mean feat. At first we found ourselves cursing the game's "poor response." The plug simply would not fit into the drain. As it turned out, however, the only faulty response was in our own hand-eye coordination. After about 20 minutes we caught on, and the game was suddenly "responding" quite well.

Plugging Away

Nit-Wit has a rather odd scenario. Six large, upside-down Y's appear on each side of the screen. These are supposed to represent drainpipes. A stream of letters begins to flow down the invisible pipes and faucets. Your job is to trap the letters (by plugging the drains) in the correct order so they will form words. Meanwhile, your opponent is facing the same

Continued on p. 25

computer gaming™

Computer Gaming is a section for all game lovers—players, designers, and programmers of microcomputer games. Regular features include product reviews, letters to the editor, player strategy, a question and answer forum, a Hall of Fame for high scorers, tutorial articles on game design and programming, plus interviews with professionals in the world of computer gaming.

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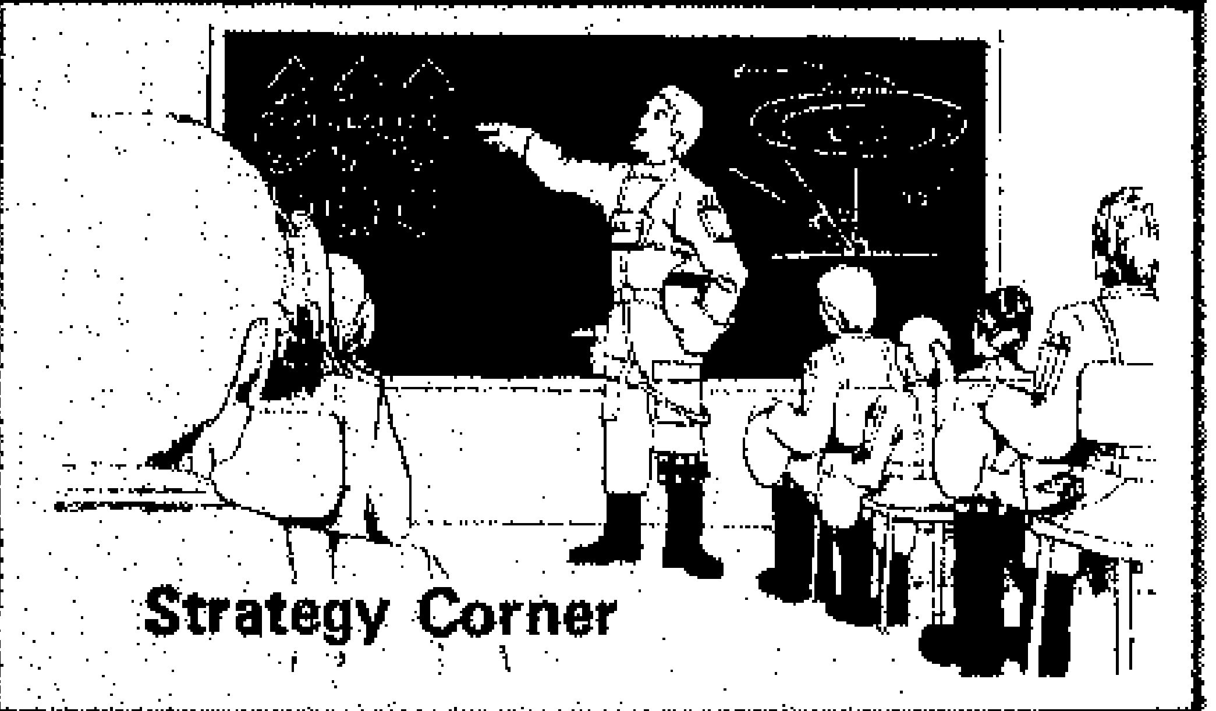
Game Review Criteria

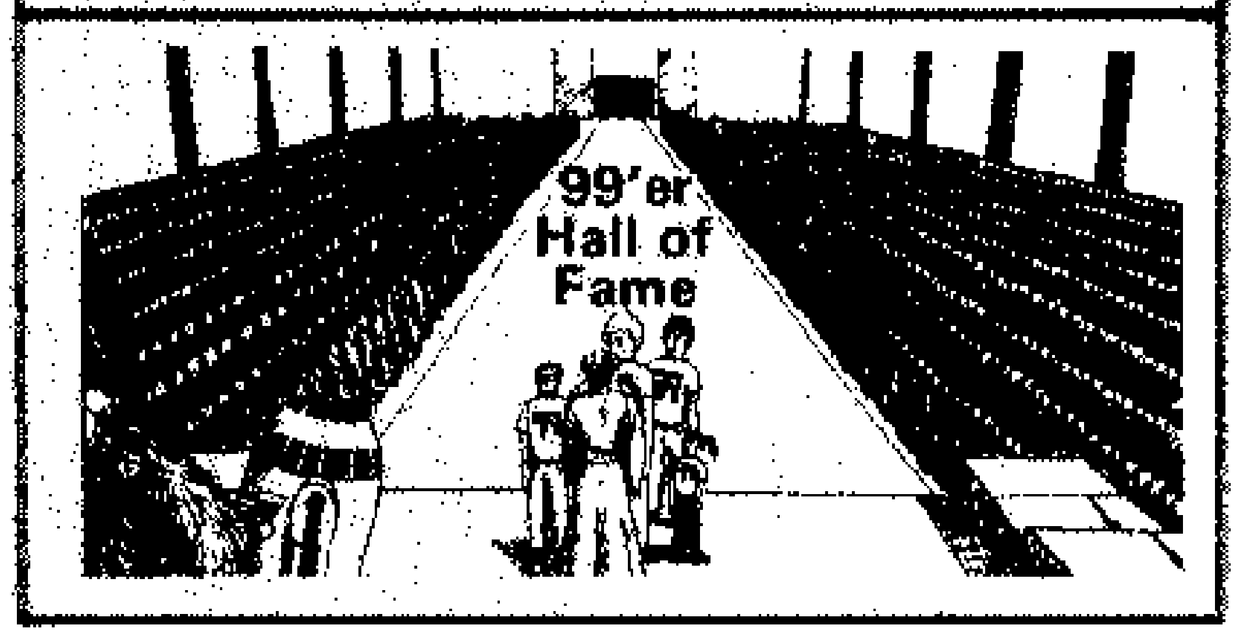
Game Performance measures how well the game responds to the player's commands, rates the quality and realism of the graphics and animation, and examines how well the sound effects, music or speech are integrated into the game. It also determines whether the game delivers what is promised in its advertisements.

Engrossment focuses on that intangible quality that holds the player on the edge of his seat while the hours tick by unnoticed. The game's *staying power* is also assessed.

Documentation rates the printed matter that comes with the game. It notes whether the instructions are clear, comprehensive and easy to use, whether the machine configuration requirements are spelled out, and looks for such information as how to load the program, use the keyboard, and restart the game.

Adventure Registry
Adventure Registry





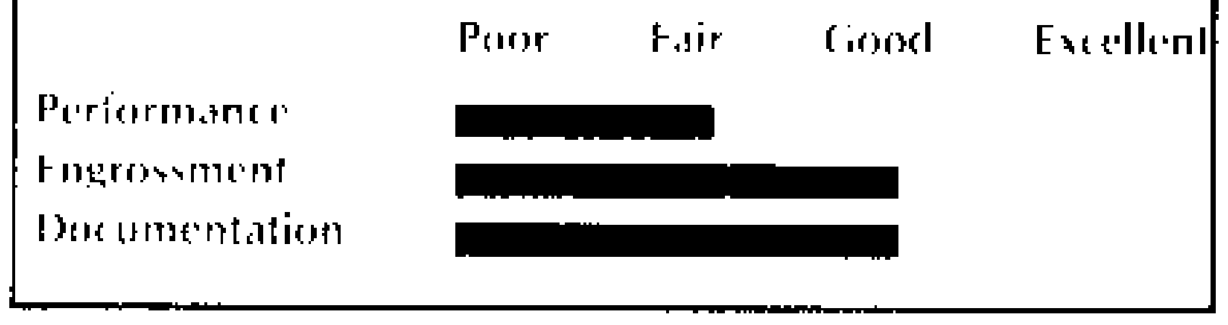
CRIME & PUNISHMENT

A Review by Greg Roberts

99'er HCM Staff

Name:	**Crime and Punishment**
Program Type:	**Courtroom game**
Language:	**TI BASIC**
Distributor:	**Decision-Making Systems Ltd. P.O. Box 9557 Wilmington, Delware 19809**
Price:	**$12.50 cassette.**

System Requirements:
Cassette Recorder



Any game outside the combat/destruction format is worth a second look: such departures make up perhaps three percent of gaming software. There's no mystery in that wide discrepancy; to offer a word game, adventure game, or other mental challenge is to exclude a great percentage of the market—mostly kids.

Crime and Punishment is meant for people who prefer more thought-provoking play—who might wonder what it is like to review criminal cases and pass sentences. The object of the game is to test your insight into our system of justice by giving you certain facts of a case, then asking you to pass sentence on the offender. You see how close you come to the sentence meted out by the judge. The game is based on the bare facts of some 1000 real-life court cases.

Sometimes those facts can seem a little bare for the effort necessary to dig them up. The program trickles information to you bit by bit. For instance, each case opens with the question, "What information do you wish?" and offers these categories: 1) Offender's criminal record, 2) Details of the crime, 3) Offender's social or psychological profile. These categories are further broken down into subsets, e.g., under Details of the Crime: Property damage or loss, physical injury, victim information, prosecution/plea bargaining, mental state at time of crime.

This procedure seems a bit awkward at first, but once you learn the routine, you can pass from one category to the next with barely a glance at the format. Then the game is much more fun.

Accompanying your score or decision-making IQ are amusing little remarks about your ability to make judicious decisions. Example: "You have the talents of a Supreme Court Justice" or "Not bad . . . it's practice you need."

Judicious Decisions?

Sometimes the machine's court sentences are hard to take: a certain murderer had previously been convicted in nine out of ten felonies, and in this case got 28 years for stabbing someone twenty times. By comparison, I had given him life (75 years) and therefore scored very low. Here the machine wisecracked, "Obviously you're very new at this game . . . maybe you'd consider a kangaroo court?". Naturally I was surprised to find how far off I was from reality. I thought I was doing society a favor; I mean, shouldn't a sicky like that be taken off the streets for life? In any case, the game measures your insight into the way things are, not necessarily the way they should be.

The scoring too, seems arbitrary at times. In several cases I was off the mark by 70% and still scored "four gavels," the level of a "high court justice."

Another oddity of the game is that a good score is dependent partly on how little information you request to guess at the case's outcome.It would seem only just for a judge to demand every shred of information in these matters, but here you get penalized for asking too much. There is a reason for this, of course—it makes the game more interesting from a competitive standpoint. And when you finally push the button and give the convicted person a specific jail term or probation period, the game reaches its high point and lets you see the actual sentence for comparison. After going through a few hundred court cases a player should be quite familiar with the kinds of punishment being dished out for a variety of crimes.

Some of the "pertinent" information may raise eyebrows in certain sectors of the community. Much mention is made of the race of offenders and victims both. And under Mental history, for instance, the program may list "latent homosexual;" or for Drug use it may say "smokes marijuana." The relevance of such facts might be questioned.

Graphics? There are none, except for the scales of justice and some gavels. But graphics are not really needed in this kind of play; it is hard to imagine how they could enhance it.

By the way, if you have a hard time loading this program, don't (as I did) accuse the post office of X-raying the package. It seems the real offender was the peripheral expansion box—with a disk operating system that used up too much memory for this program to run. Only when I disconnected the box could I get the game to load.

A mental game such as this may not grab some arcade fans—just as some arcade games can put thoughtful people to sleep—but this program will find an appreciative audience among those who are alienated by outer-space fare.

Brain Drain . . . from p. 23

challenge. When you trap a letter, a gong sounds and your opponent's rubber plug is automatically zapped back to center.

There is more than a little strategy to the game. If you dawdle plugging the drain, your opponent will gather all the letters, keeping you paralyzed in the center of your board. If, on the other hand, you scurry about grabbing the first letters you see, you will end up trying to convince your opponent that *kglvg* is a popular Norwegian fruit punch.

It is often difficult to capture the letter you want because they scroll at different speeds. In order to catch a letter you must position the plug and press the fire button a second or two before the letter drops into the drain. If you press the button too late, you will miss the letter you want and automatically collect the next one coming down the tube—whether you want it or not. If you are in place too early, another letter may pass the one you want and get to you first. So if you miss the final N for your carefully planned BUTTON, and get stuck with the falling X instead, you are out of luck— unless your opponent is a very poor speller.

Actually, I wouldn't recommend trying to bluff in this game. Once you spell your word, the message PLAYER I HAS SPELLED A WORD. IS THERE A CHALLENGE?(Y/N) appears. At this point you can challenge your opponent to find *groady* in the dictionary. This is a nice feature to include, but it could be more even-handed. If you challenge a word and win, you get a free turn. But if you challenge and lose, there is no penalty. So a poor speller has nothing to lose by challenging every doubtful word. A penalty for challenging a correct word could have made for some clever bluffing and added another dimension to the game.

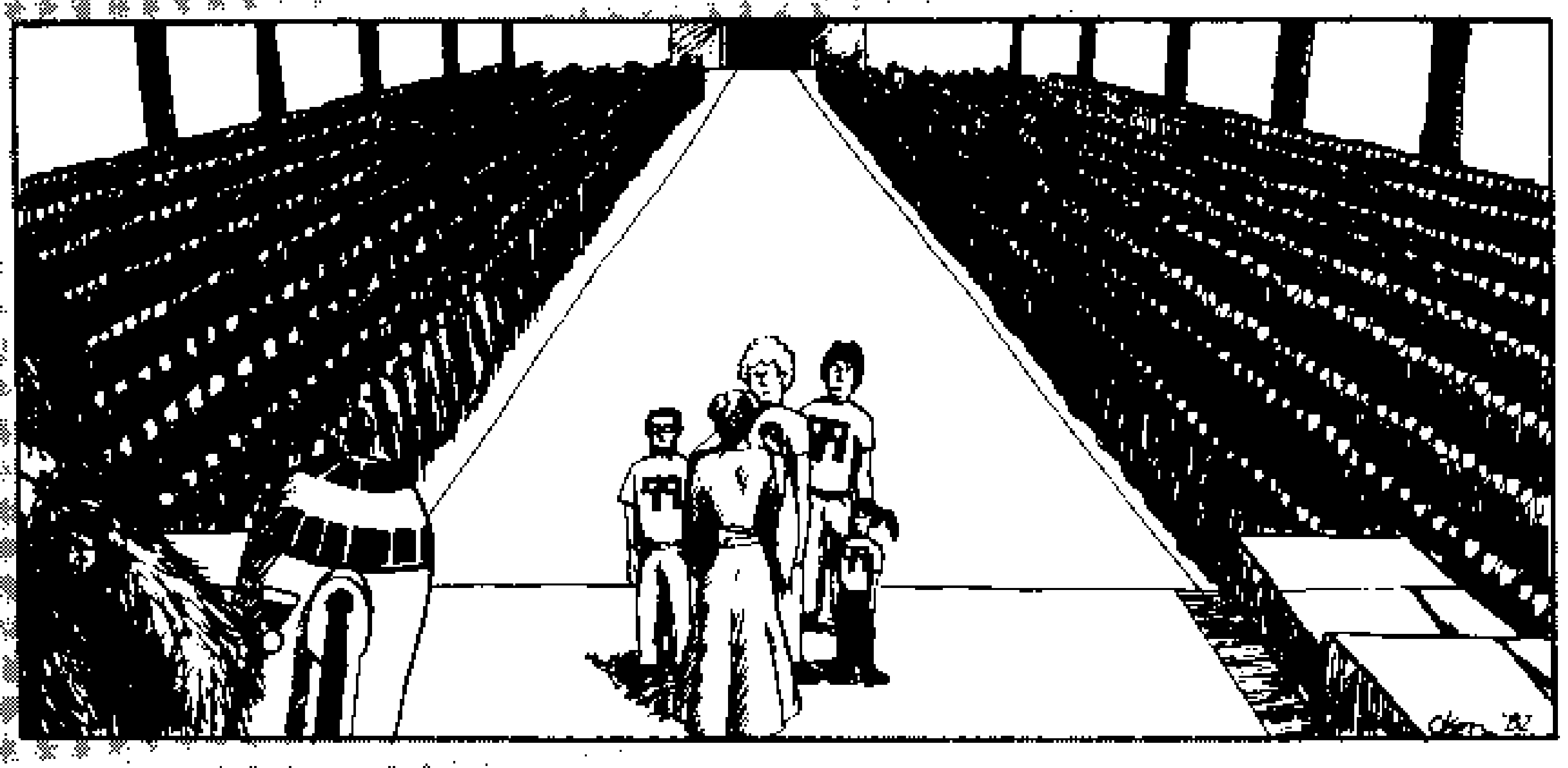
Features

The game's graphics are adequate; no fancy displays are really needed in a game of this sort. There is a nice utilization of sound to tell who has caught a letter. The documentation is complete and easy to understand, detailing the necessary equipment and explaining how to load the program and even some fine points of play. It does, however, forget to mention one thing: If you have a disk system without memory expansion, then you must disconnect the Peripheral Expansion Box to load this program from cassette.

Nit-Wit manages to combine two dimensions—using the joystick to hit a target, and forming words from random letters—into one challenging game. You have to keep your mind on several tasks at once: juggling letters to form the longest word, manipulating the plug into place, timing the fire button to trap the right letter, and, if necessary, firing the button to sabotage your opponent. With all of this going on, the game will definitely hold your interest. But even though the game kept my attention, I felt restricted by the six-letter limit each round. As an avid *Scrabble* player, I missed the creative possibilities of a full alphabet. Adding a few more letters or challenging you to form as many words as possible would enliven the pace for more dedicated word gamesters.

For the most part, however, *Nit-Wit* is a challenging and engrossing game. Its designers have hit on a pleasing combination of captivating word game and animated joystick competition. And unlike some computerized adaptations of word games, *Nit-Wit* has enough animation and visual effects to utilize the computer's capabilities. Better graphics and a more refined scenario (why plumbing and drain plugs?) would have made it more visually pleasing, and a bluff option might have spiced it up a bit. But all in all, the combination of a *Scrabble*-type game and animated letter-trapping is a winning ticket. I wouldn't hesitate to put in a plug for *Nit-Wit*.

99'er Hall of Fame



We are proud to induct the following gamesters into the 99'er Hall of Fame:

Name: **Ron Rollette Jr. (Beloit, WI)**
Game: **Munchman**
Score: **408,990 (level 4)**

Name: **David Trost, Age 14, (St. Louis, MO)**
Game: **Car Wars**
Score: **48,370**

Name: **Mike Moninger (Sarasota, FL)**
Game: **TI Invaders**
Score: **39,754**

Name: **Christopher Weiss, Age 14, (Boonton, NY)**
Game: **Parsec**
Score: **3,492,400**

Name: **Nadine Burwell, Age 18, (Toronto, Ontario)**
Game: **Lost Ruins**
Score: **329,396**

Name: **Brian Bauer, Age 5 (Kenosha, WI)**
Game: **Munchman**
Score: **271,870**

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ESTABLISHED FOR THE 99/4A

The Fly

By Joe Cook

67 Stephenville Blvd.
Red Bank, NJ 07701

It's 10:00 PM at the Cavalier household. Everyone is cozily tucked into bed—everyone, that is, except the dedicated husband and father of the brood.

"Claude, will you forget about that !#@%$&*! fly and come to bed?" calls his wife from their room.

"I'll be there, Blanche. I'll be there. I've almost got the little bugger!" replies her fly-swatter-slinging spouse.

And so goes the dialogue in countless homes across the country as family members commit themselves to ridding their houses of the last filthy flies of summer. Some fly hunters take this responsibility more seriously than others. These unsung heroes may stay awake half the night, or even all night, only to end up being beaten by the pesky fly. Perhaps it is the Brave-Little-Tailor syndrome that keeps them going, but to kill seven in one blow takes oodles of luck and practice, practice, practice.

Up until now, we have had to rely mostly on luck, because there was no way to practice—you either had a fly to swat or you didn't.

By playing *The Fly*, however, you can get the practice you need to polish your swatting technique. The proper swatting conditions are simulated in this Extended BASIC game, so that when the real moment of truth comes, you will be able to eliminate the tormenting fly without losing any sleep over it.

When the game begins, it is 10PM and your alarm clock is set for 7AM. You must swat the fly before the alarm clock rings. The actual time elapsed is just a few minutes. After that, the insistent humming of the fly gives way to the glaring ring of your alarm. If you become accomplished at wacking the wild sprite fly off the screen, you should have no trouble with the traditional land-on-the-end-of-your-nose variety. In other words, if you get a good night's sleep in your computer practice session, you probably will do likewise when you must defend your hearth and home from the real winged intruder. One of the main differences you will notice between the game and reality is that when it is a real fly, it seems to take forever to swat it. In the game, however, you will be surprised at how time flies when you are having fun!

The Fly
Explanation of the Program

Line Nos.	
100-140	Program header.
150-250	Instructions and level selection.
260-320	Initialize clock.
330-510	Define characters and sprites.
520-570	Move sprites and generate fly sound.
580-630	Move swatting man.
640-770	Player won, score displayed.
780-870	Replay or End option.
880-940	Time clock.
950-1010	The fly won.

```
100 ! ********************
110 ! *     THE FLY      *
120 ! ********************
130 !     BY JOE COOK
140 ! 99'ER VERSION 2.11.1XB
150 CALL CLEAR
160 CALL SCREEN(7)
170 PSCORE,FSCORE=0
180 PRINT "IT'S 10:00 PM AND TI
    ME FOR":"BED. YOU'RE ALL SE
    T EXCEPT":"FOR ONE THING":":
    " ":"      THE FLY":" "
190 PRINT "THE OBJECT OF THE GA
    ME IS TO":"SWAT THE FLY WHI
    LE THERE":"IS STILL TIME TO
     SLEEP"
200 PRINT " ":" ":"USE THE ARRO
    W KEYS TO MOVE,":"AND THE E
    NTER KEY TO SWAT"
210 PRINT " ":"GOOD LUCK AND SW
    EET DREAMS":"(IF YOU CAN GE
    T THAT FLY)":" ":
220 PRINT " ":"ENTER LEVEL OF P
    LAY TO":"BEGIN (1=EASY,2=HA
    RD)"
230 CALL KEY(0,LEVEL,STATUS)
240 IF STATUS=0 THEN 230
250 IF (LEVEL<>49 AND LEVEL<>50
    )THEN 230 ELSE LEVEL=(5-(LE
    VEL-48))
260 CALL CLEAR
270 CALL SCREEN(13)
280 MINUTES=0
290 HOURS=10
300 FCHAR=96
310 DISPLAY AT(1,2):HOURS;":";M
    INUTES
320 DISPLAY AT(1,11):"PM"
330 CALL CHAR(96,"0000000000000
    000")
340 CALL CHAR(97,"0000000000000
    000")
```

Continued on p. 29

The Challenge of Camelot

By Gary Garrett
7245 Alana Road
Jacksonville, FL 32211

In the days of old when knights were bold and rescued damsels in distress, all of the valorous champions were men. If you were a woman back then, you were doomed to an ivory tower, a dreary dungeon, or a dragon's den. Well, despair no more valiant ones, with this BASIC game you have a chance to enter and liberate the fourteenth century. Everyone, regardless of age, stage or chromosomes, gets an opportunity to out joust the evil Blue Knight, Sir 99.

If you are brave and triumph over this knight of dubious character, you are given the honor and responsibility of defending our fair Camelot against the firey dragons who fiendishly hover about in the foothills. Once you have defeated these four fierce adversaries you can proudly take your hard-earned seat at the round table.

The Challenge of Camelot, as you may have guessed, is a game of chance for one person against the computer (the infamous Sir 99). It has two screens or levels of play: a jousting match and a life or death struggle with firebreathing dragons.

At the beginning of each round you must choose your weapon—Lance, Mace or Sword. In the first level, Lance beats Sword, Mace beats Lance, and Sword beats Mace. The crafty Sir 99 does not tell you his choice until after the battle is fought. If you choose the same weapon as Sir 99, that round ends in a tie with neither side losing a knight. If you are the mightiest knight and thereby reach the second level, you choose from the same three weapons hoping your choice will slay the dragon. Don't get too confident, however, the dragon has his firey breath which can scorch your shield, or worse, if you get too close.

A Sound Graphics Tutorial

The program has elaborate color graphics animation and sound effects. The computer writes out the results of each battle whether you are facing Sir 99 or wicked fire from a demon dragon.

As you key in the program, pay particular attention to the statements (2020-2160) which create the graphics displays for the jousting knights, and the animation of your fall from your horse if you are beaten by Sir 99 (1370-1450). The dragon's death sequence is a dramatically animated slow wilt that might also merit a closer look at the coding (4110-4180).

Music lovers will be pleased with the way the TI 99/4A's music capacity is utilized in this program. A dedicatory fanfare invites you to choose your weapons at both levels making it seem like there are really other knights and ladies gathered around to encourage you. The familiar refrains of Lerner and Loewe's *Camelot* chime in to make your moments of triumph in the game even sweeter.

After playing this game and achieving knighthood you will undoubtedly agree that "There certainly is not a more congenial spot for happy-ever-aftering than here in Camelot."

Challenge of Camelot
Explanation of the Program

Line Nos.	
100-150	Rem header.
160-200	Intro music.
210-240	Subroutine to altergraphic patterns.
250-280	Input name and option for instructions.
290-980	Set up graphics screen for battle with the dragon.
990-1130	Display opposing knight.
1140-1170	Alter graphics patterns.
1180-1250	Display clouds.
1260-1360	Display friendly knight.
1370-1450	Friendly knight falling.
1460-1550	Initialize game #1.
1560-1810	Display towers.
1820-1850	Put clouds on the screen.
1860-1930	Put friendly knight on the screen.
1940-2010	Put enemy knight on the screen.
2020-2160	Display charging.
2170-2290	Computer chooses a weapon.
2300-2440	Player chooses a weapon.
2450-2480	Clear spare players off the screen.
2490-2540	Check outcome of battle.
2550-2690	Computer won.
2700-2860	Player wins.
2870-2930	Tie game.
2940-3090	End of section messages.
3100-3500	Check for end of game and display remaining players.
3510-3670	End of game.
3680-3750	Instructions.
3760-3950	Dragon battle-shield scorched.
3960-3970	Dragon injured.
3980-4100	Set up game #2.
4110-4180	Dragon killed.
4190-4410	Knight killed.
4420-4600	Music subroutines.
4610-4650	Subroutine to assign character graphics.
4660-4690	Subroutine to simulate Display At, without scrolling.
4700-4850	Data.

Continued on p. 31

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Fly . . . from p. 26

```
 350 CALL CHAR(98,"082A3E3E2A080
     800")
 360 CALL CHAR(99,"0000000000000
     000")
 370 CALL CHAR(100,"000000000000
     0000")
 380 CALL CHAR(101,"000000000000
     0000")
 390 CALL CHAR(102,"082A5D5D2A08
     0800")
 400 CALL CHAR(103,"000000000000
     0000")
 410 CALL CHAR(104,"000000000000
     0003")
 420 CALL CHAR(105,"040307080B03
     0408")
 430 CALL CHAR(106,"7F7F7F7F7F7F
     7F08")
 440 CALL CHAR(107,"8808F8000000
     8040")
 450 CALL CHAR(108,"000000000000
     0003")
 460 CALL CHAR(109,"040307080B03
     0408")
 470 CALL CHAR(110,"000000000000
     0000")
 480 CALL CHAR(111,"807FFF7F7F7F
     FF7F")
 490 CALL MAGNIFY(LEVEL)
 500 CALL SPRITE(#1,96,11,100,10
     0)
 510 CALL SPRITE(#5,108,2,50,50)
 520 IF FCHAR=96 THEN FCHAR=100
     ELSE FCHAR=96
 530 CALL PATTERN(#1,FCHAR)
 540 X=(RND-0.5)*35
 550 Y=(RND-0.5)*35
 560 CALL MOTION(#1,X,Y)
 570 CALL SOUND(-1000,RND*8+260,
     RND*10)
 580 CALL KEY(0,KEY,STAT)
 590 IF STAT=0 THEN CALL MOTION(
     #5,0,0):: GOTO 880
 600 IF KEY=69 THEN CALL MOTION(
     #5,-25,0):: GOTO 880
 610 IF KEY=68 THEN CALL MOTION(
     #5,0,25):: GOTO 880
 620 IF KEY=88 THEN CALL MOTION(
     #5,25,0):: GOTO 880
 630 IF KEY=83 THEN CALL MOTION(
     #5,0,-25):: GOTO 880
 640 IF KEY<>13 THEN 880
 650 CALL MOTION(#5,0,0)
 660 CALL PATTERN(#5,104)
 670 CALL COINC(#1,#5,10,HIT)
 680 CALL SOUND(-150,-4,0)
 690 IF HIT=0 THEN 850
 700 CALL COLOR(#1,7)
 710 CALL MOTION(#1,0,0)
 720 CALL MOTION(#5,0,0)
 730 CALL SOUND(-3000,-3,0)
 740 PSCORE=PSCORE+1
 750 DISPLAY AT(3,2):"YOU GOT TH
     E FLY"
 760 DISPLAY AT(4,2):"SWEET DREA
     MS"
 770 DISPLAY AT(6,2):"SCORE: YOU
     ";PSCORE;" THE FLY";FSCORE
 780 DISPLAY AT(7,2):"DO YOU WAN
     T TO PLAY AGAIN?"
 790 DISPLAY AT(8,2):"(Y/N) ?"
 800 CALL KEY(0,KEY,STATUS)
 810 IF STATUS=0 THEN 800
 820 IF KEY=78 THEN CALL CLEAR :
     : STOP
 830 IF KEY=89 THEN CALL DELSPRI
     TE(ALL):: GOTO 220
 840 GOTO 800
 850 CALL PATTERN(#5,108)
 860 IF FCHAR=96 THEN FCHAR=100
 870 CALL PATTERN(#1,FCHAR)
 880 MINUTES=MINUTES+5
 890 IF MINUTES=60 THEN MINUTES=
     0 :: HOURS=HOURS+1
 900 IF HOURS=12 THEN DISPLAY AT
     (1,11):"AM"
 910 IF HOURS=13 THEN HOURS=1
 920 DISPLAY AT(1,2)SIZE(8):HOUR
     S;":";MINUTES
 930 IF HOURS=7 THEN 950
 940 GOTO 520
 950 FOR J=1 TO 120
 960 CALL SOUND(30,900,0)
 970 NEXT J
 980 FSCORE=FSCORE+1
 990 DISPLAY AT(3,2):"MORNING"
1000 DISPLAY AT(4,2):"YOU DIDN'T
      SLEEP ALL NIGHT"
1010 GOTO 770
```

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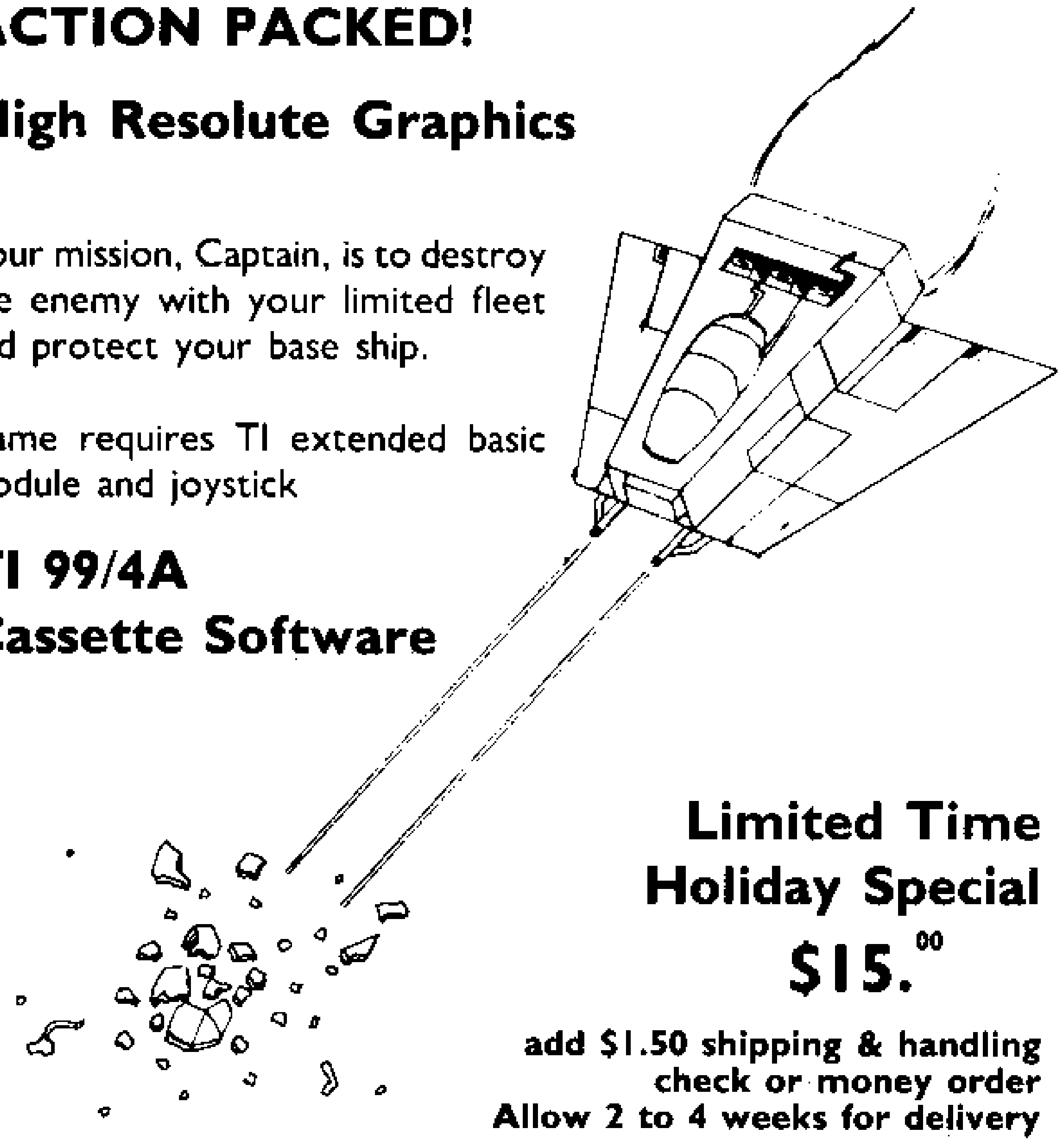

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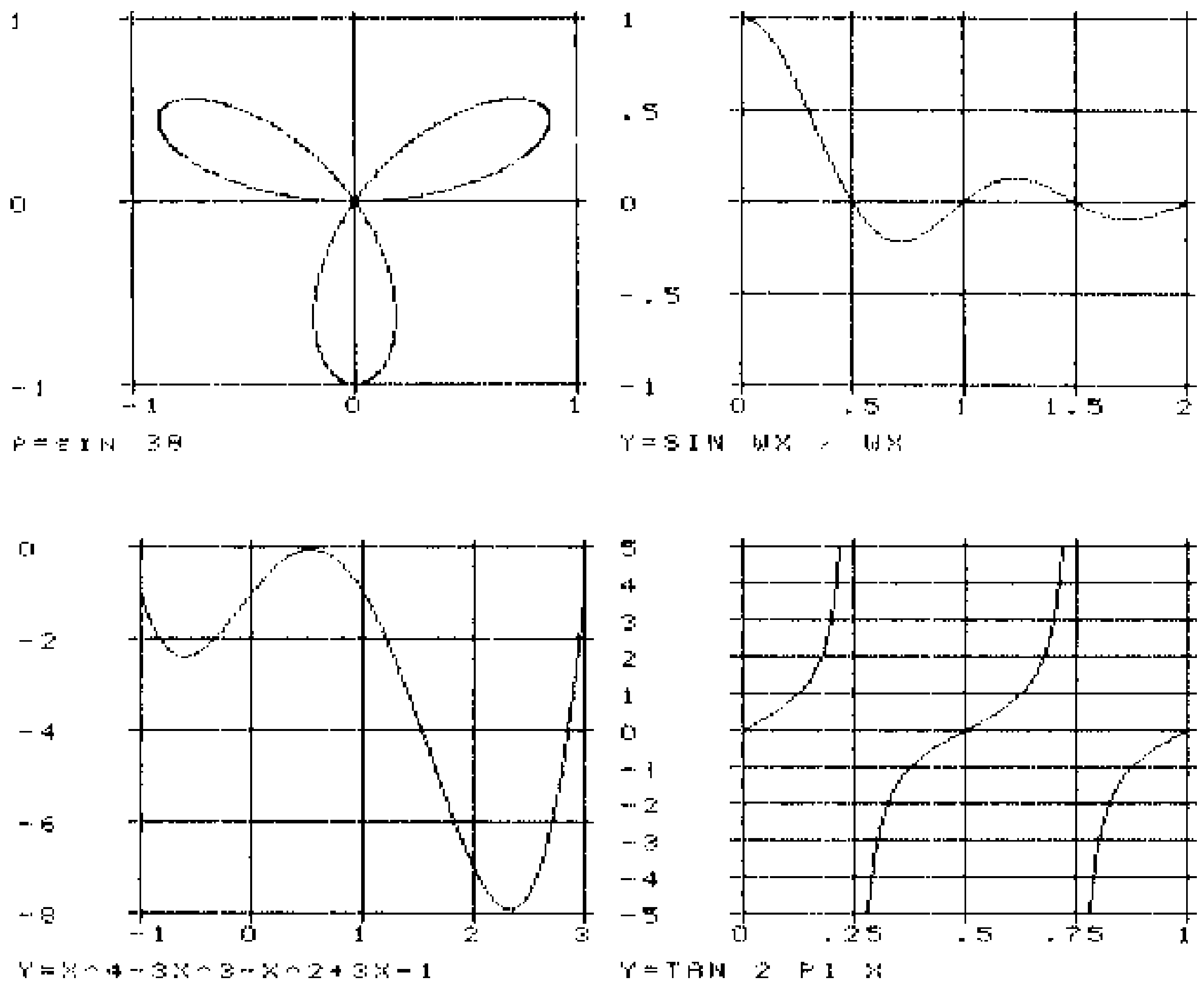

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Camelot . . . from p. 27

```
100 REM  *****************
110 REM  * CHALLENGE OF  *
120 REM  *     CAMELOT   *
130 REM  *****************
140 REM  BY  GARY GARRETT
150 REM   99'ER VERSION 2.11.1
160 CALL CLEAR
170 GOSUB 4440
180 GOSUB 4490
190 CALL CLEAR
200 GOTO 250
210 RESTORE 4700
220 R=10
230 GOSUB 4610
240 RETURN
250 INPUT "NAME PLEASE: ":O$
260 INPUT "INSTRUCTIONS? (Y/N)
    ":A$
270 IF A$="Y" THEN 3680 ELSE 14
    60
280 CALL CLEAR
290 G=2
300 CALL SCREEN(8)
310 PRINT "   CHALLENGE OF CAME
    LOT   "::::::::::::::::
320 PRINT O$,"   THE DRAGON":::
    :::::
330 DATA 6,5,7,10,4,21,6,27
340 DATA 10,1,9,2,10,15,9,16,8,
    17,7,18,10,1,1,1
350 DATA 10,14,7,25,9,31,10,32,
    10,1
360 RESTORE 4720
370 R=11
380 GOSUB 4610
390 CALL COLOR(9,16,1)
400 CALL COLOR(14,2,1)
410 CALL COLOR(10,5,16)
420 CALL COLOR(11,5,8)
430 DATA 3,3,4,9,5,14,3,17,3,27
    ,3,3
440 GOSUB 1140
450 RESTORE 330
460 FOR I=1 TO 4
470 READ X,Y
480 CALL HCHAR(X,Y,101)
490 CALL HCHAR(X,Y+1,102)
500 CALL HCHAR(X+1,Y-1,101)
510 CALL HCHAR(X+1,Y,103,2)
520 CALL HCHAR(X+1,Y+2,102)
530 CALL HCHAR(X+2,Y-1,104)
540 CALL HCHAR(X+2,Y,105,2)
550 CALL HCHAR(X+2,Y+2,106)
560 CALL HCHAR(X+2,Y-2,112)
570 CALL HCHAR(X+2,Y+3,113)
580 CALL VCHAR(X+3,Y-2,114,12-(
    X+3))
590 CALL VCHAR(X+3,Y-1,114,12-(
    X+3))
600 CALL VCHAR(X+3,Y,114,12-(X+
    3))
610 CALL VCHAR(X+3,Y+1,114,12-(
    X+3))
620 CALL VCHAR(X+3,Y+2,114,12-(
    X+3))
630 CALL VCHAR(X+3,Y+3,114,12-(
    X+3))
640 NEXT I
650 RESTORE 340
660 FOR I=1 TO 6
670 READ X,Y
680 CALL HCHAR(X,Y,112)
690 CALL VCHAR(X+1,Y,114,12-(X+
    1))
700 NEXT I
710 RESTORE 350
720 FOR I=1 TO 4
730 READ X,Y
740 CALL HCHAR(X,Y,113)
750 CALL VCHAR(X+1,Y,114,12-(X+
    1))
760 NEXT I
770 CALL HCHAR(9,8,107)
780 CALL HCHAR(8,25,107)
790 RESTORE 430
800 FOR F=1 TO 5
810 GOSUB 1180
820 NEXT F
830 RESTORE 1870
840 FOR I=1 TO 4
850 READ X
860 Y=8
870 GOSUB 1260
880 NEXT I
890 RESTORE 4830
900 R=8
910 GOSUB 4610
920 RESTORE 1870
930 FOR I=1 TO 4
940 READ A
950 B=25
960 GOSUB 990
970 NEXT I
980 GOTO 2170
990 CALL COLOR(12,13,1)
1000 CALL HCHAR(A,B+3,32,3)
1010 CALL HCHAR(A+1,B+3,32,3)
1020 CALL HCHAR(A,B-1,120)
1030 CALL SOUND(9,-1,9)
1040 CALL HCHAR(A,B,121)
1050 CALL HCHAR(A,B+1,32)
1060 CALL HCHAR(A,B+2,122)
1070 CALL HCHAR(A+1,B-1,123)
1080 CALL HCHAR(A+1,B,124)
1090 CALL HCHAR(A+1,B+1,125)
1100 CALL SOUND(9,-2,9)
1110 CALL HCHAR(A+1,B+2,126)
1120 CALL HCHAR(A+1,B+3,127)
1130 RETURN
1140 RESTORE 4750
1150 R=4
1160 GOSUB 4610
1170 RETURN
1180 READ X,Y
1190 CALL HCHAR(X,Y,99)
1200 CALL HCHAR(X,Y+1,100)
1210 CALL HCHAR(X+1,Y-2,97)
1220 CALL HCHAR(X+1,Y-1,99)
1230 CALL HCHAR(X+1,Y,98,2)
1240 CALL HCHAR(X+1,Y+2,100)
1250 RETURN
1260 CALL HCHAR(X,Y-3,32,2)
1270 CALL HCHAR(X+1,Y-3,142,2)
1280 CALL HCHAR(X,Y-1,131)
```

Continued on p. 33

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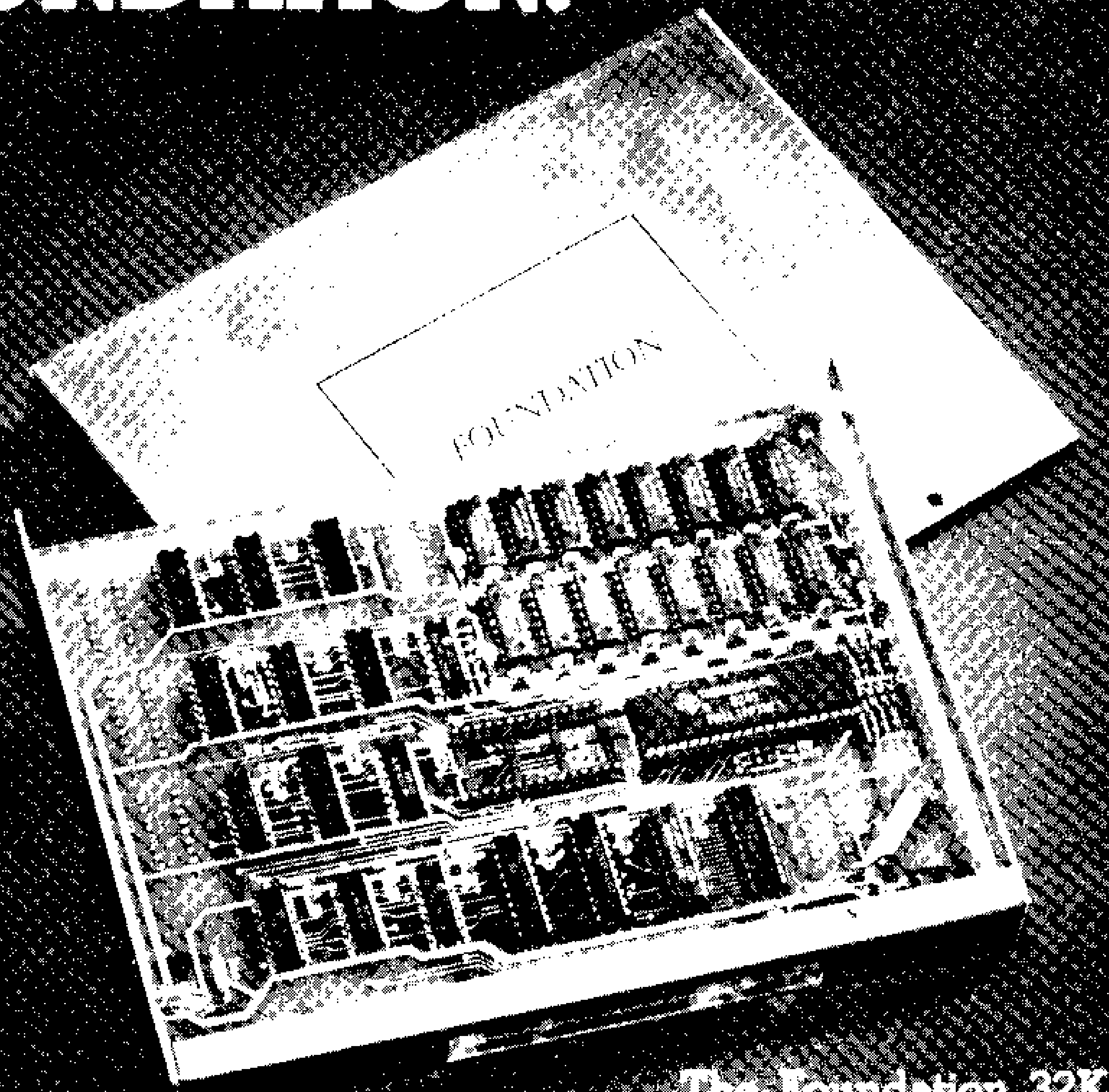

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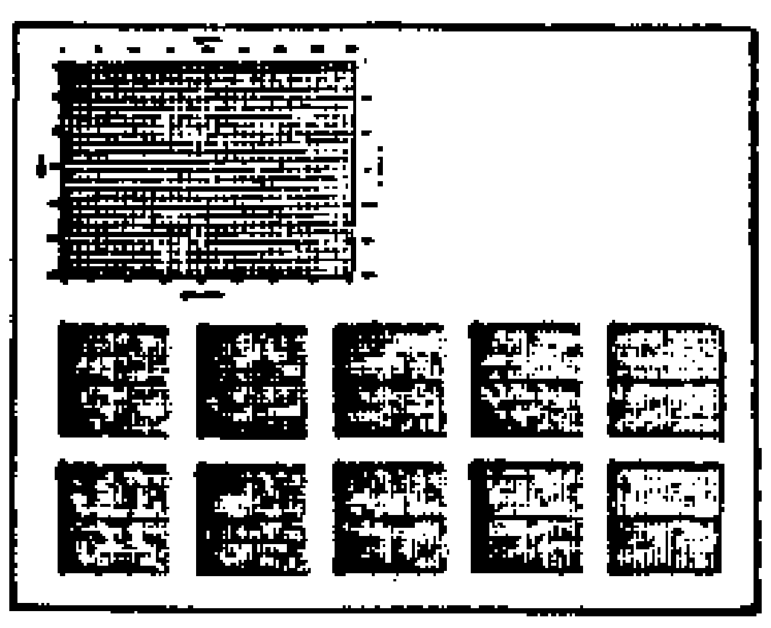

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Camelot . . . from p. 31

```
1290 CALL SOUND(8,-2,9)
1300 CALL HCHAR(X,Y,132)
1310 CALL SOUND(8,-3,9)
1320 CALL HCHAR(X,Y+1,133)
1330 CALL HCHAR(X+1,Y-1,141)
1340 CALL HCHAR(X+1,Y,140)
1350 CALL HCHAR(X+1,Y+1,143)
1360 RETURN
1370 CALL HCHAR(A,B+2,32,2)
1380 CALL COLOR(4,5,1)
1390 CALL HCHAR(A,B-1,58)
1400 CALL SOUND(8,-1,9)
1410 CALL HCHAR(A,B,59)
1420 CALL SOUND(8,-2,9)
1430 CALL HCHAR(A,B+1,60)
1440 CALL HCHAR(A+1,B-1,142,5)
1450 RETURN
1460 G=1
1470 CALL CLEAR
1480 CALL SCREEN(8)
1490 PRINT O$;",":"PLEASE WAIT W
     HILE I MEASURE YOU FOR YOUR
      SUIT OF ARMOUR":::
1500 RESTORE 4760
1510 R=7
1520 GOSUB 4610
1530 PRINT "IT LOOKS LIKE YOU WE
     AR AN   OFF THE RACK SIZE":
     :::
1540 FOR I=1 TO 300
1550 NEXT I
1560 DATA 9,4,7,7,7,9,5,12,5,15,
     4,17,5,19,5,22,7,25,7,27,9,
     30,17,15,16,17,17,19
1570 PRINT "     CHALLENGE OF CAM
     ELOT"::::::::::::::O$,"
         SIR 99"::::::::
1580 CALL COLOR(9,16,1)
1590 CALL COLOR(10,9,16)
1600 CALL COLOR(13,2,1)
1610 CALL COLOR(14,2,12)
1620 CALL HCHAR(11,1,106,32)
1630 DATA 4,7,3,25,4,29
1640 GOSUB 1140
1650 RESTORE 1560
1660 FOR I=1 TO 14
1670 READ X,Y
1680 CALL HCHAR(X,Y,101)
1690 CALL HCHAR(X+1,Y-1,102)
1700 CALL HCHAR(X+1,Y,103)
1710 CALL HCHAR(X+2,Y-1,104,2)
1720 CALL HCHAR(X+3,Y-1,105,2)
1730 CALL HCHAR(X+4,Y-1,105,2)
1740 IF (10<Y)*(Y<23)THEN 1750 E
     LSE 1780
1750 CALL HCHAR(X+5,Y-1,105,2)
1760 CALL HCHAR(X+6,Y-1,105,2)
1770 CALL HCHAR(X+4,Y-1,104,2)
1780 CALL HCHAR(11,5,106,24)
1790 NEXT I
1800 CALL HCHAR(14,1,106,32)
1810 CALL HCHAR(13,5,142,24)
1820 RESTORE 1630
1830 FOR F=1 TO 3
1840 GOSUB 1180
1850 NEXT F
1860 GOSUB 210
1870 DATA 12,18,20,22
1880 RESTORE 1870
1890 FOR I=1 TO 4
1900 READ X
1910 Y=8
1920 GOSUB 1260
1930 NEXT I
1940 RESTORE 1870
1950 FOR I=1 TO 4
1960 READ A
1970 B=25
1980 GOSUB 1370
1990 NEXT I
2000 GOSUB 4490
2010 GOTO 2170
2020 DATA 10,23,12,21,14,19,16,1
     7
2030 RESTORE 2020
2040 FOR F=1 TO 4
2050 READ Y,B
2060 X=12
2070 A=12
2080 IF G=1 THEN 2110
2090 GOSUB 990
2100 GOTO 2120
2110 GOSUB 1370
2120 GOSUB 1260
2130 NEXT F
2140 CALL SOUND(200,1000,0,3250,
     0,6750,0)
2150 CALL SOUND(200,1000,15,3250
     ,15,6750,15)
2160 GOTO 2500
2170 M=4
2180 N=4
2190 X=12
2200 A=12
2210 GOSUB 210
2220 RANDOMIZE
2230 C=INT(RND*3)+1
2240 ON C GOTO 2250,2270,2290
2250 W$="LANCE "
2260 GOTO 2300
2270 W$="MACE"
2280 GOTO 2300
2290 W$="SWORD "
2300 DATA 67,72,79,79,83,69,32,3
     2,32,76,32,77,32,83
2310 RESTORE 2300
2320 FOR A=3 TO 16
2330 READ B
2340 CALL HCHAR(24,A,B)
2350 NEXT A
2360 GOSUB 4560
2370 CALL KEY(0,A,B)
2380 IF B=0 THEN 2370
2390 A$=CHR$(A)
2400 CALL HCHAR(24,1,32,32)
2410 CALL HCHAR(15,1,32,32)
2420 P=POS("LMS",A$,1)
2430 IF P>0 THEN 2450
2440 GOTO 2310
2450 FOR A=18 TO 23
2460 CALL HCHAR(A,4,32,6)
2470 CALL HCHAR(A,23,32,8)
2480 NEXT A
```

Continued on p. 35

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Camelot . . . from p. 33

```
2490 ON G GOTO 2020,3980
2500 IF C=P THEN 2920
2510 IF C+P=4 THEN 2870
2520 IF P<=C THEN 2540
2530 ON G GOTO 2700,4110
2540 IF G=2 THEN 4190
2550 RESTORE 4780
2560 R=7
2570 GOSUB 4610
2580 DATA 18,15,20,13,22,11,24,9
     ,26,7,28,5
2590 RESTORE 2580
2600 A=12
2610 X=12
2620 FOR I=1 TO 5
2630 READ Y,B
2640 GOSUB 1370
2650 GOSUB 1260
2660 NEXT I
2670 N=N-1
2680 P$="I WON, I USED A "
2690 GOTO 3100
2700 M=M-1
2710 RESTORE 4800
2720 R=3
2730 GOSUB 4610
2740 P$="YOU WON, I USED A "
2750 X=12
2760 Y=16
2770 GOSUB 1260
2780 RESTORE 2580
2790 FOR I=1 TO 5
2800 READ Y,B
2810 X=12
2820 A=12
2830 GOSUB 1370
2840 GOSUB 1260
2850 NEXT I
2860 GOTO 3100
2870 ON G GOTO 2900,2880
2880 IF P>C THEN 4190
2890 GOTO 4110
2900 IF P>C THEN 2550
2910 GOTO 2700
2920 P$="NO ONE WON, I USED A "
2930 ON G GOTO 2750,3760
2940 FOR I=1 TO 400
2950 NEXT I
2960 ON G GOTO 2970,3050
2970 CALL HCHAR(3,1,32,416)
2980 CALL HCHAR(16,1,32,16)
2990 CALL HCHAR(16,19,32,14)
3000 PRINT :"YOU HAVE WON IN THE
      JOUST,   ":"AND AS THE MIGH
     TIEST KNIGHT":"YOU MUST DEF
     END OUR FAIR      "
3010 PRINT "CAMELOT FROM THE DEM
     ON    ":"DRAGON. GOOD LUCK":
     :::
3020 GOSUB 4490
3030 INPUT "PRESS ENTER TO CONTI
     NUE":A$
3040 GOTO 280
3050 PRINT "SIR ";O$:"YOU HAVE E
     ARNED THE HIGHEST":"HONORS
     FOR YOUR VALOR":"THEREFORE"
3060 PRINT :"I WELCOME THEE TO T
     HE ":"ROUND TABLE":::
3070 GOSUB 4440
3080 GOSUB 4440
3090 GOTO 3510
3100 M$=P$&W$
3110 X=15
3120 Y=3
3130 GOSUB 4660
3140 IF N=0 THEN 3290
3150 IF M=0 THEN 2940
3160 IF N=1 THEN 3320
3170 X=18
3180 Y=8
3190 GOSUB 1260
3200 IF N=2 THEN 3320
3210 X=20
3220 Y=8
3230 GOSUB 1260
3240 IF N=3 THEN 3320
3250 X=22
3260 Y=8
3270 GOSUB 1260
3280 GOTO 3320
3290 FOR I=1 TO 700
3300 NEXT I
3310 GOTO 3510
3320 IF M=1 THEN 3440
3330 A=18
3340 B=25
3350 ON G GOSUB 1370,990
3360 IF M=2 THEN 3440
3370 A=20
3380 B=25
3390 ON G GOSUB 1370,990
3400 IF M=3 THEN 3440
3410 A=22
3420 B=25
3430 ON G GOSUB 1370,990
3440 X=12
3450 Y=8
3460 A=12
3470 B=25
3480 GOSUB 1260
3490 ON G GOSUB 1370,990
3500 GOTO 2210
3510 M$="PLAY AGAIN? (Y/N)"
3520 X=24
3530 Y=7
3540 GOSUB 4660
3550 CALL KEY(0,A,B)
3560 IF B=0 THEN 3550
3570 IF A=78 THEN 3640
3580 CALL HCHAR(24,1,32,32)
3590 GOSUB 4490
3600 N=4
3610 M=4
3620 IF G=2 THEN 1460
3630 GOTO 3140
3640 CALL CLEAR
3650 PRINT O$;",":"THANK YOU FOR
      PLAYING"
3660 GOSUB 4490
3670 END
3680 CALL CLEAR
```

Continued on p. 39

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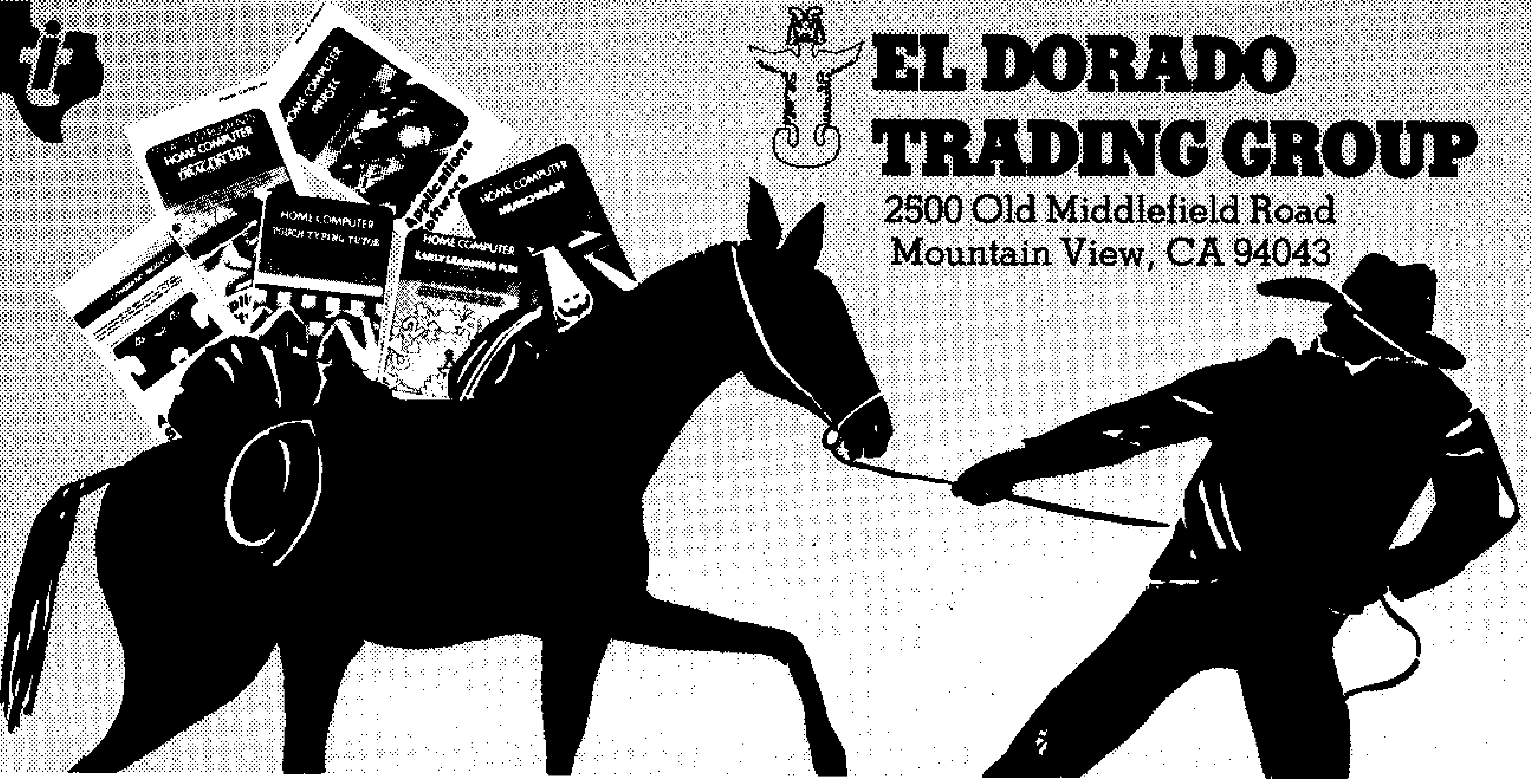

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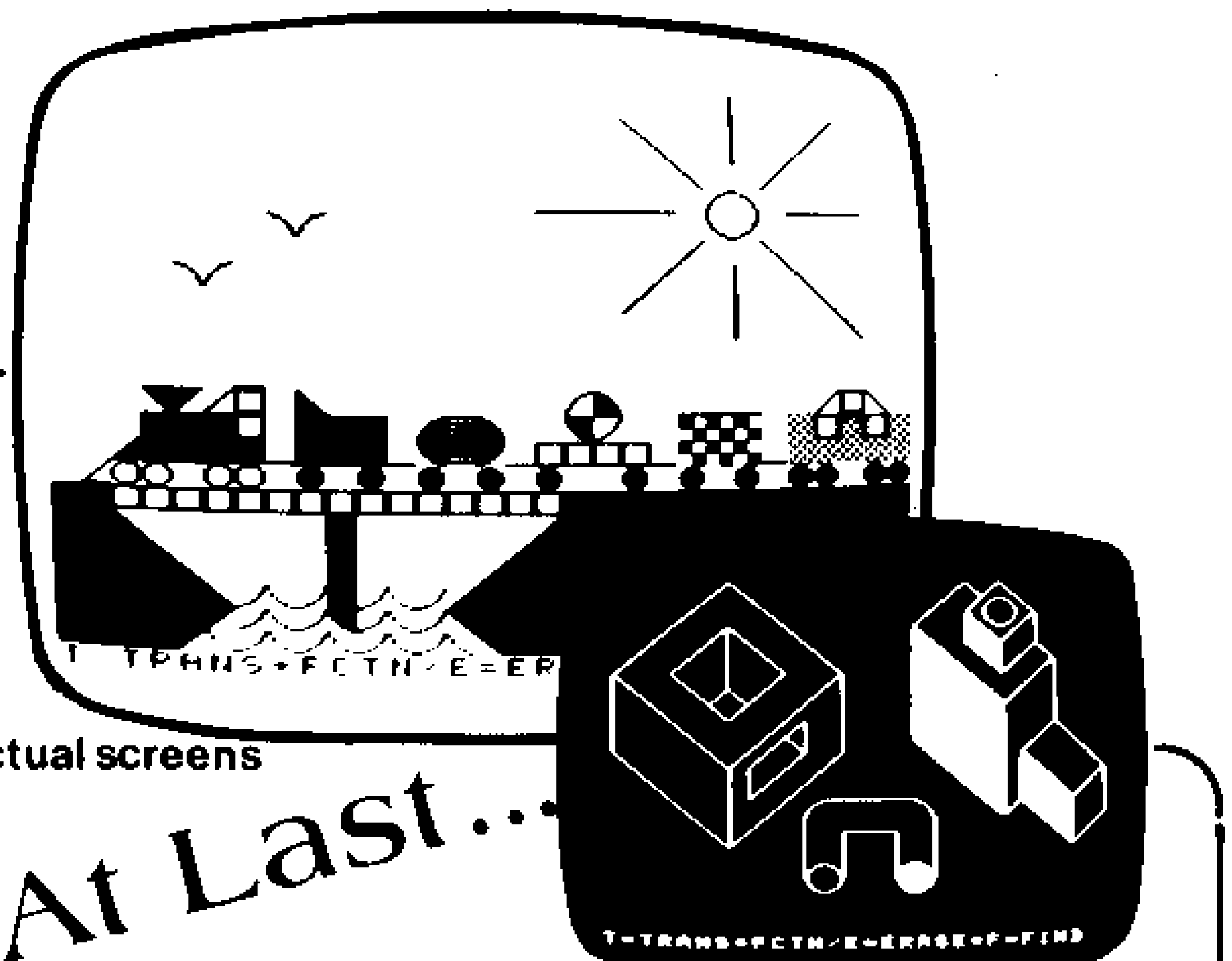

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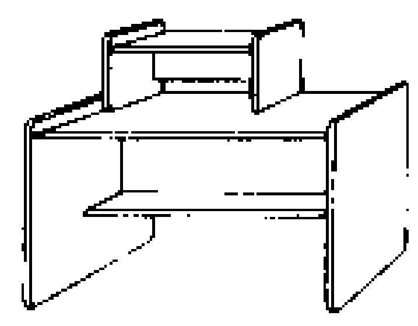

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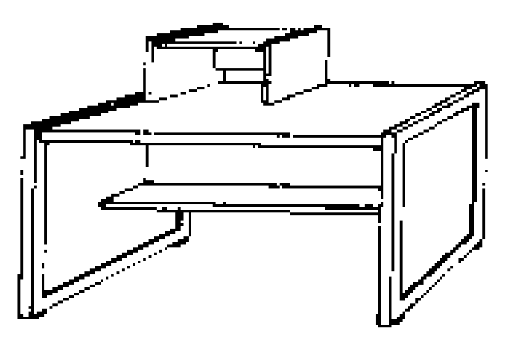

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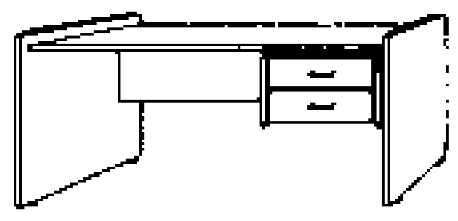

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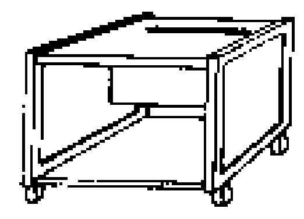

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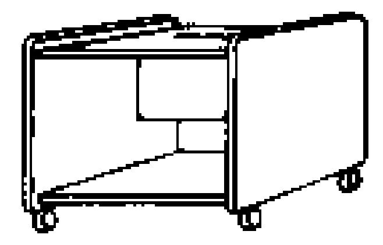

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Camelot . . . from p. 35

```
3690 PRINT "YOU HAVE 4 KNIGHTS T
     O ENTER"::"A JOUST TO DETE
     RMINE IF YOU "::"ARE WORTHY
      OF DEFENDING"::
3700 PRINT "CAMELOT FROM 4 DEMON
      DRAGONS"::"YOU HAVE CHOICE
      OF 3 WEAPONS"::"LANCE, MAC
     E AND SWORD":::
3710 PRINT "LANCE BEATS SWORD"::
     "MACE BEATS LANCE"::"SWORD
     BEATS MACE":::
3720 GOSUB 4490
3730 INPUT "PRESS ENTER TO START
     ":A$
3740 GOSUB 4560
3750 GOTO 1460
3760 CALL COLOR(12,10,1)
3770 CALL COLOR(12,3,1)
3780 RANDOMIZE
3790 F=INT(RND*2)+1
3800 ON F GOTO 3810,3960
3810 CALL SOUND(-99,-5,1)
3820 CALL COLOR(13,16,10)
3830 CALL COLOR(14,16,10)
3840 CALL COLOR(13,16,1)
3850 CALL COLOR(14,16,1)
3860 CALL COLOR(13,12,1)
3870 CALL COLOR(14,12,1)
3880 CALL COLOR(13,2,1)
3890 CALL COLOR(14,2,1)
3900 CALL SOUND(150,-6,0)
3910 FOR I=0 TO 30 STEP 5
3920 CALL SOUND(150,-7,I)
3930 NEXT I
3940 M$="   YOUR SHIELD WAS SCORC
     HED  "
3950 GOTO 4320
3960 M$="YOU HAVE INJURED THE DR
     AGON"
3970 GOTO 4320
3980 DATA 10,23,12,21,14,19,15,1
     8
3990 RESTORE 3980
4000 FOR F=1 TO 4
4010 READ Y,B
4020 X=12
4030 A=12
4040 GOSUB 990
4050 GOSUB 1260
4060 NEXT F
4070 FOR I=0 TO 30 STEP 15
4080 CALL SOUND(200,1000,I,3250,
     I,6750,I)
4090 NEXT I
4100 GOTO 2500
4110 CALL COLOR(12,10,1)
4120 CALL COLOR(12,3,1)
4130 RESTORE 4810
4140 R=8
4150 GOSUB 4610
4160 M$="    YOU DEFEATED THIS DR
     AGON"
4170 M=M-1
4180 GOTO 4320
4190 CALL SOUND(-99,-5,1)
4200 RESTORE 4850
4210 FOR I=1 TO 4
4220 READ A,B
4230 CALL COLOR(13,A,B)
4240 CALL COLOR(14,A,B)
4250 NEXT I
4260 CALL SOUND(150,-6,0)
4270 FOR I=0 TO 30 STEP 5
4280 CALL SOUND(150,-7,I)
4290 NEXT I
4300 M$="   YOUR KNIGHT WAS SCORC
     HED"
4310 N=N-1
4320 X=15
4330 Y=2
4340 GOSUB 4660
4350 CALL HCHAR(12,1,32,128)
4360 CALL COLOR(13,2,1)
4370 CALL COLOR(14,2,1)
4380 RESTORE 4830
4390 R=8
4400 GOSUB 4610
4410 GOTO 3140
4420 DATA 262,262,523,523,523,52
     3,466,466,440
4430 DATA 262,330,392,523,330,39
     2,523,659,392,523,659,784,5
     23,659,784,1046,1046
4440 RESTORE 4430
4450 FOR I=1 TO 17
4460 READ F
4470 CALL SOUND(100,F,12)
4480 NEXT I
4490 RESTORE 4420
4500 FOR I=1 TO 9
4510 READ A
4520 CALL SOUND(200,A,19)
4530 NEXT I
4540 CALL SOUND(1600,440,20,175,
     20)
4550 RETURN
4560 FOR I=1 TO 3
4570 CALL SOUND(100,262,15,1047,
     15)
4580 CALL SOUND(300,392,15,1568,
     15)
4590 NEXT I
4600 RETURN
4610 FOR U=1 TO R
4620 READ A,A$
4630 CALL CHAR(A,A$)
4640 NEXT U
4650 RETURN
4660 FOR I=1 TO LEN(M$)
4670 CALL HCHAR(X,Y+I,ASC(SEG$(M
     $,I,1)))
4680 NEXT I
4690 RETURN
4700 DATA 131,000000000100314F,1
     32,40E0E1F9AFFBAFAF,133,000
     000E0FFE08000,58,0000000007FF
     070100
4710 DATA 59,0207879FF5BFF5F5,60
     ,000000008000ECEF,140,DEFE2
     F33010A0400,141,8F1F1E18344
     28100,142,0
4720 DATA 143,0000000804020100,101
     ,01030B0F1F3FBFFF,102,80C0C
     0E0F8F8FDFF,103,FFFFFFFFFFFF
     FFFFF,104,10A262CC981135FD
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Continued on p. 75

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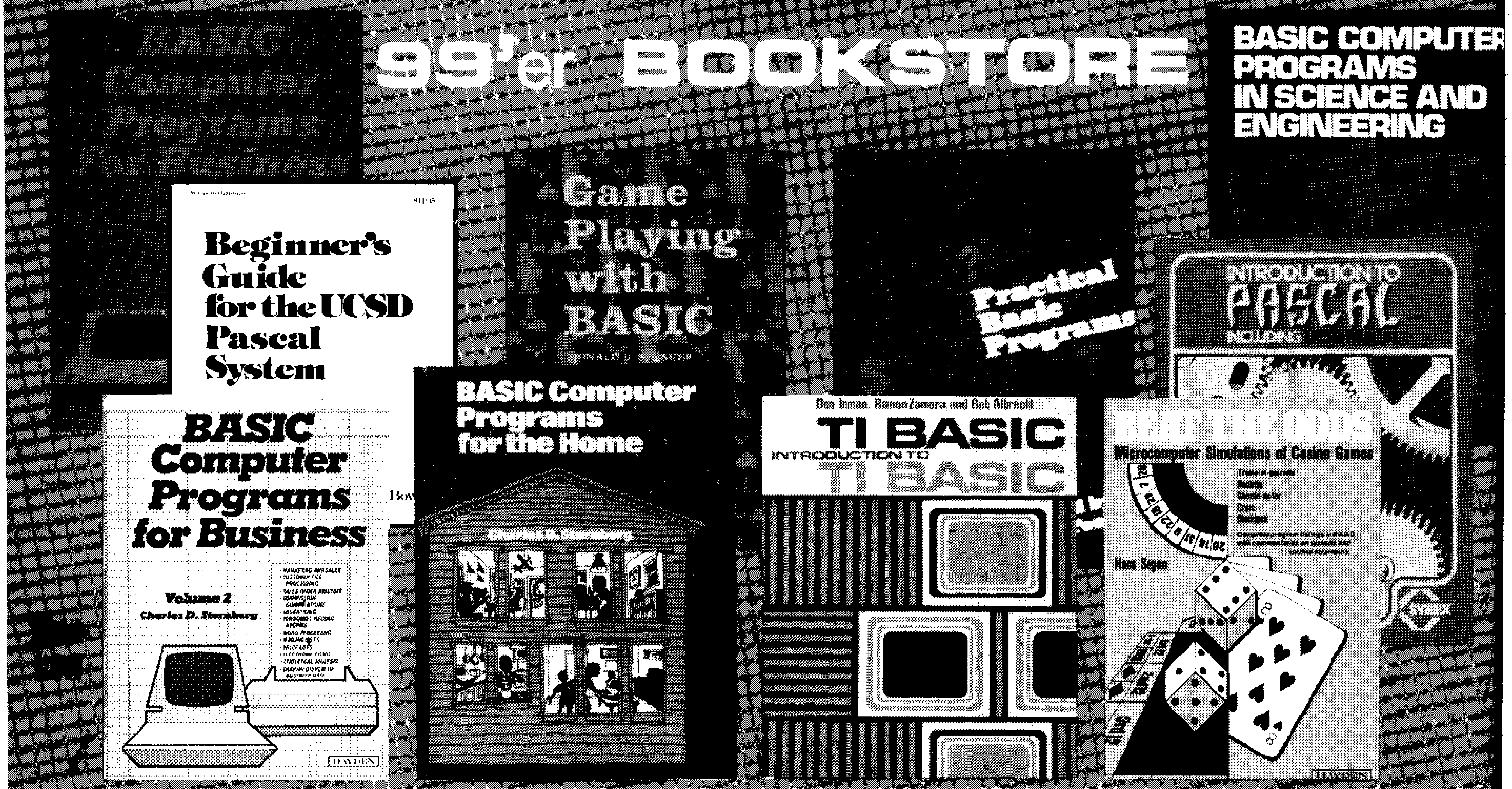
BASIC COMPUTER PROGRAMS IN SCIENCE AND ENGINEERING
Beginner's Guide for the UCSD Pascal System
Game Playing with BASIC
Practical Basic Programs
INTRODUCTION TO PASCAL
BASIC Computer Programs for Business
Volume 2
Charles D. Sternberg
BASIC Computer Programs for the Home
Charles D. Sternberg
Don Inman, Ramon Zamora, and Bob Albrecht
TI BASIC
INTRODUCTION TO TI BASIC
BEAT THE ODDS
Microcomputer Simulations of Casino Games
Hans Sagan
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By Charles D. Sternberg.

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BASIC COMPUTER PROGRAMS FOR BUSINESS: VOL. 2

By Charles D. Sternberg.

A collection of programs (with function and operation documentation) covering the critical facets of business operation: sales planning and analysis, personnel, word processing, mailing lists, price list systems, record control, scheduling systems, etc.

paper, **$14.95**
1982, 376 pages, 7×10

BEGINNER'S GUIDE FOR THE UCSD PASCAL SYSTEM

By Kenneth Bowles.

This highly informative book is written by the originator of the UCSD Pascal System. It is designed as an orientation guide for learning to use the UCSD Pascal System, and features tutorial examples of programming tasks in the form of self-study quiz programs. Once familiar with the system you will find the guide an invaluable reference tool for creating advanced applications.

paper, **$13.95**
1980, 204 pages, 6×9

BASIC COMPUTER PROGRAMS FOR THE HOME

By Charles D. Sternberg.

An invaluable book containing over 75 practical home application programs that will be helpful to the novice or experienced owner in increasing the usefulness of any home computer. Each program is documented with a description of its functions and operation, a listing in BASIC, a symbol table, sample data, and one or more samples.

paper, **$12.95**
1979, 336 pages, 7×10, illus.

GAME PLAYING WITH BASIC

By Donald D. Spencer.

Enjoy the challenge of competition with your computer. Amuse yourself with such games and puzzles as 3-D Tic-tac-toe, Nim, Roulette, Magic Squares, the 15 Puzzle, Baccarat, Knight's Magic Tour, and many others. The writing is nontechnical, allowing almost anyone to understand computerized game playing.

paper, **$12.50**
1977, 176 pages, 6×9, illus.

BASIC COMPUTER PROGRAMS IN SCIENCE AND ENGINEERING

By Jules. H. Gilder.

Save time and money with this collection of 114 ready-to-run BASIC programs for the hobbyist and engineer. There are programs to do such statistical operations as means, standard deviation averages, curve-fitting, and interpolation. There are programs that design antennas, filters, attenuators, matching networks, plotting, and histogram programs.

paper, **$12.95**
1980, 160 pages, 6×9, illus.

PRACTICAL BASIC PROGRAMS

Edited by Lon Poole

Here is a new collection of 40 programs you can easily key in and use on most microcomputers. Each program does something useful. Practical BASIC Programs is especially useful in small business applications. It solves problems in finance, management decision, mathematics and statistics. It requires no prior programming knowledge. Each program is thoroughly documented. The book contains sample runs, practical problems, BASIC source listings, and an easy to follow narrative to help you realize the potential uses of each program.

paper, **$17.50**
1980, 200 pages, 8½×11

INTRODUCTION TO TI BASIC

By D. Inman, R. Zamora,
and R. Albrecht.

This comprehensive work will teach you all about computer and BASIC for use with the Texas Instruments Home Computer. Even if you've never worked with a computer, you can now teach yourself how to use, program and enjoy the TI Home Computer with this entertaining, and easy-to-read work. The authors have carefully constructed this introduction so that you will soon be writing BASIC programs and exploiting all of the excellent features of the TI machines. Its 14 chapters and Appendices cover all of the essential programming statements and machine features.

paper, **$13.95**
1980, 384 pages, 7×10

INTRODUCTION TO PASCAL (INCLUDING UCSD PASCAL)

By Rodnay Zaks

This is the first book on Pascal that can be used by persons who have never programmed before, but more generally it is a simple and comprehensive introduction to standard and UCSD Pascal for anyone—beginner to experienced programmer—who wants to learn the language rapidly. The logical progression and graduated exercises—designed to provide practice as well as test skill and comprehension—enable the reader to begin writing simple programs almost immediately.

paper, **$17.95**
1981, 440 pages, 7×9

BEAT THE ODDS: MICROCOMPUTER SIMULATIONS OF CASINO GAMES

By Hans Sagan.

Here's an extremely useful programming guide that provides realistic simulations of five popular Casino games: Trente-et-Quarante (Thirty and Forty), Roulette, Chemin-de-Fer, Craps, and Blackjack. Each of the five chapters has the same structure. It begins with a computer run, displaying facets of the programs, followed by an explanation of the objectives and the physical execution of the game. Acceptable bets and how to place them are discussed and systems and/or strategies laid out. Finally, the computer program is developed and various modifications of the program are detailed.

paper, **$10.95**
1980, 128 pages, 6×9

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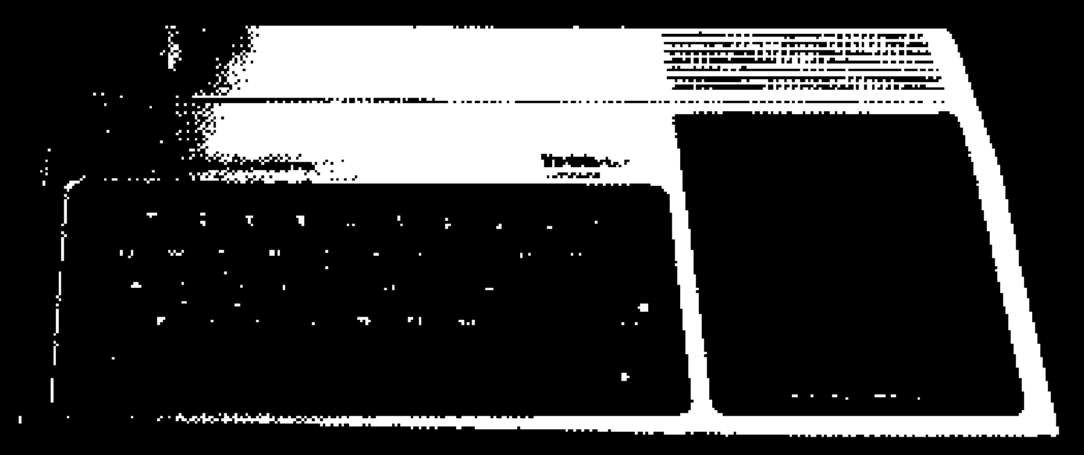

OF
COMMERCIALLY AVAILABLE
SOFTWARE, PERIPHERALS AND ACCESSORIES

A BI-ANNUAL GUIDE TO THE WARES OF THIRD-PARTY FIRMS
SUPPORTING THE TEXAS INSTRUMENTS HOME COMPUTER

INTRODUCTION

***99'er Home Computer Magazine* is pleased to present the first edition of our semi-annual *99'er Directory of Commercially Available Software, Peripherals, and Accessories* for the TI-99/4A. Commercial third-party manufacturers have furnished us with the very latest and most comprehensive information on their product lines for the 99/4A, and in this *Directory* we're passing the information along to you. We think you'll find the *Directory* easy to read and convenient.**

We've divided our entries into three main sections:

- **I. Software**
- **II. Peripherals and Accessories**
- **III. Alphabetical List of Third-Party Manufacturers**

Under Sections I and II we've provided categories to help you find the program, peripheral, or accessory you're looking for or haven't even realized you want yet. We've used category classifications that are already familiar to you from your experience with catalogs and other directories, though we have tried to improve on them a bit. Our major accomplishments in this respect are in little refinements such as separate Music and Word Processing categories and a further breakdown of the Education category into three areas. We take a taxonomist's pride in the fact that our Category 8, that catchall, "Other," doesn't contain very much in either the Software or the Peripherals and Accessories sections of our directory.

Both we and the manufacturers who submitted information to us were cognizant of the fluid nature of software categorization. Rather than duplicate entries, when a program qualifed, say, for both the Business and Home Management categories, and perhaps as a Programming Aid too, we tried to place it in the category where it would have the heaviest use.

You'll notice that the Software section of our directory does not include two important sources of programs for the TI-99/4A: For reasons of space, neither Texas Instruments' own extensive line of software nor the varied and innovative but difficult-to-document programs of the many 99/4A users groups are included in our directory. For information on TI's software products and some programs available through users groups, we recommend Texas Instruments' own *Software Directory*. Assembled by seven staff members of TI's Personal Computer Division, the directory is well-organized into Category, TI Category, Author, and Keyword indexes, and a Program Abstracts section which is especially helpful. TI's 220-page *Directory* sells for $5.95 plus $2.00 for shipping and handling. You can order it toll-free from Texas Instruments by calling 1-800-858-4565.

Additional copies of our *99'er Directory* are available for $2.50 including shipping and handling. Bulk copies for re-sale and promotional use can be ordered from our Bulk Sales Department:

99'er Home Computer Magazine
Attn: Bulk Sales
1500 Valley River Drive, Suite 250
Eugene, Oregon 97401

The *99'er Directory of Commercially Available Software, Peripherals, and Accessories* was developed and produced by the following staff members of *99'er Home Computer Magazine*:

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Abbreviations used in the Directory

/ = "or"
Cass = Cassette
CC = Command Cartridge
Dsk = Diskette
EdAss = TI Editor/Assembler system
Mini Mem = Mini Memory CC
MBX Exp Sys = Milton Bradley Expansion System
NA = Not available
PEB = TI Peripheral Expansion Box
RS232 = RS232 Interface
SpEd = Speech Editor CC
SpSyn = Speech Synthesizer
TE II = Terminal Emulator II
X-BASIC = Extended BASIC CC
32K MExp = 32 Memory Expansion Device

Note to Software, Peripheral, and Accessory Manufacturers

If your software, peripherals, or accessories are not listed in this edition of the *99'er Directory*, and you'd like them to be listed in the March, 1984 edition, or if you'd like to make additions to or deletions from your current offerings, please write for submission/change forms to:

99'er Home Computer Magazine
Attn: 99'er Directory Listing
1500 Valley River Drive, Suite 250
Eugene, OR 97401

Notice to Directory Users

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Home Management/Personal Finance							
Auto Maintenance	AM010	Dsk	DD&C, MExp, X-BASIC		Record of auto maintenance schedule		19.95
Home Inventory	AM010	Dsk	DD&C, X-BASIC		Inventory of household possessions		16.95
Wall Street Analyst	AR010	Cass/Dsk	CR&C/DD&C		Investment program		25.00
Home Evaluator	AR010	Cass/Dsk	CR&C/DD&C		House evaluation		7.00
IRA	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor		Individual Retirement Account projections		14.95
Amortize	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor	Printer/RS232	Loan Amortization Schedule		19.95
Annuities	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor		Annuity calculations by example		14.95
Home Budget	B0010	Cass/Dsk	CR&C/DD&C, X-BASIC		Maintains yearly budget data in 17 categories		10.00/12.50
Household Monthly Expense Analyzer and Record Keeper	BA010	Cass	CR&C		Monthly budget and expense record keeper		23.00
Calendar	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC		Displays calendar for any month of any year using Gregorian system		12.95
Tax Preparation Aid 1982	BE020	Cass	CR&C, X-Basic	RS232, Printer	Federal 1040&Sch A		19.00
Tax Preparation Aid 1983	BE020	Cass	CR&C,X-Basic	RS232, Printer	Federal 1040&Sch A	1/84	24.00
Checkbook I	CA030	Cass	CR&C		Checkbook		9.95
Checkbook II	CA030	Cass	CR&C		Checkbook and reconciliation		12.95
Checkbook III	CA030	Cass	CR&C		Checkbook II and budget		18.95
The Amortizer	CA030	Cass	CR&C	X-BASIC	Interest & loan balances		8.95
Home Inventory	CA030	Cass	CR&C		Home possessions information		14.95
Medical Records	CA030	Cass	CR&C		Medical records filer		14.95
Stock Un-broker	CA030	Cass	CR&C		Stock portfolio analysis		19.95
Auto Records	CA030	Cass	CR&C		Repairs & maintenance		14.95
Tax Package	CA030	Cass	CR&C		1983 Tax return	12/83	24.95
Tax Planner	CA030	Cass	CR&C		1984 Tax planner	12/83	24.95
Utility Filer	CA030	Cass	CR&C		Records your utility usage		14.95
Calendar	CU010	Cass/Dsk	CR&C/DD&C		Any month of any year		12.00
Check Book	CU010	Cass/Dsk	CR&C/DD&C		Checkbook manager		12.50
Mailing List	CU010	Cass/Dsk	CR&C/DD&C		Mailing list manager		12.50
Financial Decisions for Home & Business	DE030	Cass	CR&C, Monitor	RS232, Printer	All the calculations needed for investments, loans, mortgages		14.95
Auto-Typewriter	DE030	Cass	CR&C, RS232, Printer		Inputs to screen, edits, prints & stores letters on tape		14.95
Energy Conservation/ Residential Heating	DY020	Cass/Dsk	CR&C/DD&C		Estimate $ savings thru energy conservation methods		28.00
Talking Bartender	EA010	Dsk	DD&C, TE II, SpSyn		Drink recipes		24.95
Telephone Directory	EA010	Dsk	DD&C, X-BASIC		Stores, dials numbers		24.95
Mortgage and Loan Amortization Schedule	FO030	Cass	CR&C		Figures monthly payment, interest, principal and balance. Screen displays one full year at a time.		14.95
Address and Telephone File	GA010	Cass/Dsk	CR&C/DD&C, X-BASIC,		Store and retrieve addresses and telephone numbers. Sort by name street, city, state and zip or phone or area code		14.95
Budget	GA010	Cass	CR&C, X-BASIC		Enter data by month, semi-annually and annually. Computer will then list your budget for the month you want.	1/84	14.95
Mailing List	GE020	Cass	CR&C		Catalog all important information		7.95
Name and Address System	HA010	Dsk	DD&C		151 records file		30.00
Car Care	HO010	Cass	CR&C		Diagnosis of car trouble		12.95
Nutrition I	HO010	Cass	CR&C		Nutrition deficiencies	7/84	19.95
Pet Care	HO010	Cass	CR&C		Common pet health concerns	12/83	15.95
The Financial Wiz	IN050	Cass	CR&C		Loans/Investments		14.50 U.S., 16.00 Can.
The File Manager	IN050	Cass	CR&C		Data base program		10.50 U.S., 12.00 Can.
"Budgie"	J0040	Cass	CR&C,X-BASIC	RS232, Printer	Budget monitoring on daily basis		20.00
Video Tape Finder	KA010	Cass	CR&C	RS232, Printer, SpSyn	Manages video tape collection. Finds titles and sorts according to Alpha,theater, ratings		35.00
Menu Planner	KA010	Cass	CR&C	SpSyn	A recipe finder		15.00
Expense File	LA010	Cass/Dsk	CR&C/DD&C		Record and manipulate expense data		29.95
Income File	LA010	Cass/Dsk	CR&C/DD&C		Record and manipulate income data		29.95
Money Matters	MA010	Cass	CR&C	X-BASIC	Household financial analysis	12/83	14.95
Financial Pak	MI090	Cass	CR&C		Loans and investments		free w/PSI lab
Super checkbook	OA010	Dsk	DD&C, X-BASIC, 32K MExp		Checkbook manager		19.95
Home Budget Planning	PA020	Cass	CR&C		Extensive control of home budget		9.95
Stock Market	PA020	Cass	CR&C		Financial aid to decisions concerning stock market		9.95
Tax Preparer (personal)	PR010	Dsk	DD&C, X-BASIC, RS232, Printer, 32KMExp		Enter income & expenses, completes tax forms	2/84	24.95
Household Inventory	PR020	Cass	CR&C		Inventory list		6.50
Credit Card File	PR020	Cass	CR&C		Permanent record of credit card numbers and business names		6.50
Mailing List	RI020	Dsk	DD&C, X-BASIC	RS232, Printer	Mailing list		19.95
Monthly Budget Master	S0010	Cass/Dsk	CR&C/DD&C	X-BASIC, RS232, Printer	Family or small business budgeting system with 30 accounts		12.00/14.00
Income Tax Planner	S0010	Cass/Dsk	CR&C/DD&C, X-BASIC		Personal income tax planning program. Automatic calculation of federal taxes owed.		12.00/14.00 18.00 for both
Home Budget Management	SO080	Dsk	DD&C, X-BASIC, MExp, 80-Column Printer		Complete income, expense, asset and liability accounting with budget comparisons		29.95
Personal Register	T0030	Cass	CR&C	X-BASIC	Personal Finance (files)		14.95
Personal Ledger	T0030	Cass	CR&C		Personal Finance, account filing, organizing budgets		14.95
Extended Register	T0030	Cass	CR&C, X-BASIC, Personal Register		Manipulates files generated by the Personal Register	1/84	9.95
Financial Forecaster	T0030	Cass	CR&C		Project income vs. debts, using Personal Ledger file	1/84	14.95

CC = Command Cartridge, CR&C = Cassette Recorder & Cables, DD&C = Disk Drive & Controller; See Contents Page for Other Abbreviations

Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Medical Insurance Forecaster	T0030	Cass	CR&C		Projects insurance-paid portion of your bill	11/83	9.95
Check Book Balancer	TE060	Cass	CR&C		Balance your check book or reconcile it with a monthly bank statement		9.95
General Ledger	UN020	Cass	CR&C, MiniMem	RS232, Printer	Home/small business bookkeeping		29.95
Financial Decisions	UN020	Cass	CR&C,MiniMem	RS232, Printer	Present value, interest rate, number of payments		29.95
Household Money Manager	VA010	Cass	CR&C		Month-to-month budgeting of home finances		9.95 +2.00 s&h
File Book I-C	WE030	Cass	CR&C,X-BASIC		Record keeping, up to 120 Records		22.95
File Book II-D	WE030	Cass	CR&C, X-BASIC		Record keeping, 6 field sort, search		27.95
Charting with Income & Expenses	WE030	Cass	CR&C, X-BASIC		2 income & 28 expense categories accounting record		17.95
Charting with Expenses	WE030	Cass	CR&C, X-BASIC		32 expense categories accounting record		17.95
Charting with Expenses II	WE030	Cass	CR&C, X-BASIC		55 expense categories accounting record		24.95

Business/Professional

Alphabetic Sort and Duplicate Eliminator	AL010	Cass	CR&C, X-BASIC		Sorts up to 20 alphanumeric entries and eliminates duplicates		4.95
Automatic Telephone Tone Dialer	AL010	Cass/Dsk	CR&C/DD&C, X-BASIC, PEB	SpSyn	Using TV speaker, program will tone dial anywhere in U.S.A., stores 100 names and numbers		19.95
Automatic Telephone Tone Dialer	AL010	Plug-in Module			Using TV speaker, program will tone dial anywhere in U.S.A. Stores 100 names and numbers.	11/83	TBA
Labelmaster	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, X-BASIC, RS232, Printer		Design labels on-screen; print as many as needed		17.95
Mail Manager	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, X-BASIC, RS232, Printer, 32KMExp		Name, address storage, select or sequence print labels designed on screen		44.95
Accounting Ledger	BI010	Dsk	DD&C		Keeps track of income and expenses		29.00
Mail Out	BI010	Dsk	DD&C		1100 names and addresses output on labels		29.00
Inventory Control	BI010	Dsk	DD&C		Keeps track of 1100 items, up to 8 columns of information		29.00
Letter Writer	BI010	Dsk	DD&C		Aids in writing and printing of letters or regular text		29.00
Nutri Data TI	CA010	Dsk	DD&C, X-BASIC, PEB, 32KMExp, RS232, 80-Column Printer		Nutritional Analysis		250.00
Financial	CR010	Dsk	DD&C, X-BASIC, Printer		General ledger functions		125.00
Order Entry/Inventory	CR010	Dsk	DD&C, X-BASIC, RS232, Printer		Maintains on-hand inventory; identifies purchase orders and back orders		125.00
Payroll	CR010	Dsk	DD&C, X-BASIC	RS232, Printer	Prints payroll checks, produces check registers and quarterly reports		95.00
Receivable/Payable	CR010	Dsk	DD&C, X-BASIC, RS232, Printer		Receivable and payable functions		125.00
Amp Design	CU010	Cass/Dsk	CR&C/DD&C		Class A, Transistor		14.95
Hydraulic Engineering	CU010	Cass/Dsk	CR&C/DD&C		Programs		34.95
Structural Engineering	CU010	Cass/Dsk	CR&C/DD&C		Programs		34.95
TV or Monitor	CU010	Cass/Dsk	CR&C/DD&C		Adjustment program		11.95
Wide Beam	CU010	Cass/Dsk	CR&C/DD&C		Selection/Analysis		25.00
Cash Reg I	DE020	Dsk	DD&C, X-BASIC, RS232, Printer		Point of sale inventory management program, 750 items in inventory, 250 customers and 30 suppliers		59.95
Cash Reg II	DE020	Dsk(2)	DD&C, X-BASIC, RS232, Printer		Same as above: up to 2000 items in inventory, 750 customers and 100 suppliers		79.95
Cash Reg III	DE020	Dsk(3)	DD&C, X-BASIC, RS232, Printer		Same as above: up to 4000 items in inventory, 900 customers and 100 suppliers		99.95
Trendline	DY020	Cass/Dsk	CR&C/DD&C	X-BASIC	Stock analysis, stored financial files		28.00
Gas Properties	DY020	Dsk	DD&C,X-BASIC	RS232, Printer	Mix any of 87 different gases		30.00
Compressor Performance	DY020	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Determine performance of compressor		24.00
Venturi & Sharp-Edged Orifice	DY020	Cass/Dsk	CR&C/DD&C	Printer	Determine flow rates of gases		18.00
The Scheduler	DY020	Dsk	DD&C, X-BASIC, 32KMExp, RS232, 80-column Printer		Critical Path method scheduling program.		38.00
Automatic Filer	EA010	Dsk	DD&C, X-BASIC, 32KMExp		Database management		37.95
Data Conveyer	EA010	Dsk	DD&C, X-BASIC, 32KMExp		Numerical operations on Automatic Filer		27.95
Non-Profit	EA010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp		Income, expense report for non-profit organization		34.95
Statement Analysis	EA010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp		Analyze corporate financial statements		34.95
Name-It	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Holds 2500 characters per file/holds 63,000 characters per file		32.00/35.00
Master Disk File	EX010	Dsk	DD&C, X-BASIC	RS232, Printer	Perpetual file of disks and programs		15.00
Netan	GY030	Cass	CR&C,X-BASIC		Network Analysis in Elec Engineering		45.00
Poles-Zeros to Time	GY030	Cass	CR&C,X-BASIC		Network Analysis in Elec Engineering		15.00
Text Files Manager	HA010	Disk	DD&C		Utility program		30.00
Testing	HA010	Cass	CR&C		Trainee testing		35.00
Budget	HA010	Cass	CR&C		Sales allocations		35.00
Curve Fit	MA040	Cass/Dsk	CR&C/DD&C		Regression curve fit		10.00
Plot	MA040	Cass/Dsk	CR&C/DD&C, TI-99 Printer, RS232		Data Plotting Routine		10.00
Roots	MA040	Cass/Dsk	CR&C/DD&C		Real Roots of Polynomials		10.00
Integration	MA040	Cass/Dsk	CR&C/DD&C		Numerical integration		10.00
Present Value	MA040	Cass/Dsk	CR&C/DD&C		Net present value of investment		10.00
Matrix Math	MA040	Cass/Dsk	CR&C/DD&C		Addition, Subtraction, Scholar Math, Multiplication		10.00

CC = Command Cartridge, CR&C = Cassette Recorder & Cables, DD&C = Disk Drive & Controller; See Contents Page for Other Abbreviations

Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Simultaneous Equations	MA040	Cass/Dsk	CR&C/DD&C		Linear equation solutions		10.00
Volumes	MA040	Cass/Dsk	CR&C/DD&C		Flow design for pipes		10.00
Flow	MA040	Cass/Dsk	CR&C/DD&C		Tank, vessels and other volumes		10.00
Cooling	MA040	Cass/Dsk	CR&C/DD&C		Residential cooling design		10.00
Heating	MA040	Cass/Dsk	CR&C/DD&C		Residential heating design		10.00
Custom Programs	MA040	Cass/Dsk	CR&C/DD&C		Programs custom written in Engineering, Math		25.00
High-Resolution Graphs	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Plot graphs in Cartesian or polar		15.00/17.50
Gamma/Bessel Functions	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Including non-integral order		10.00/12.50
Linear Equations	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Real and complex roots, through 5th order		10.00/12.50
Tax Preparer (business)	PR010	Dsk	DD&C, X-BASIC, RS232, Printer, 32KMExp		Completes schedules C,D,E,F,G,R,RP,SE, Forms 2106,2119,3903,2440,2441	2/84	49.95
Bond Computation	RI020	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Computes yields for coupon and 0 coupon bonds		19.95
Annuity	RI020	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Computes annuity table		19.95
Call Option	RI020	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Computes returns for stock options		19.95
Bond/Annuity/Call Option	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Above 3 programs combined by menu		39.95
Option Analysis Program	RI020	Dsk	DD&C, X-BASIC	RS232, Printer	8 call and put option strategies		49.95
Financial Analysis	RI020	Dsk	DD&C, X-BASIC	RS232, Printer	All above programs combined by menu		79.95
Portfolio Mgt	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Manages investment portfolio		99.95
Mailing List	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Mailing list		19.95
Naval Architecture Section Modules	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Calculates section modules		179.95
Tank Capacity	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Calclulates capacities of tanks		99.95
Appointment Calendar	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Keeps track of appointments		19.95
Sales Analysis	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Analyzes sales by product and/or products		19.95
Survey Calc	RI020	Dsk	DD&C,X-BASIC	RS232, Printer	Calculates and checks survey traverses		99.95
Cash Flow Manager	SO050	Cass	CR&C				15.95
Accounts Receivable	TE030	Dsk	DD&C, X-BASIC, 32KMExp		Accounts Receivable program		9.95
Stock Portfolio Manager	TE060	Cass/Dsk	CR&C/DD&C		Evaluate the performance of your stock portfolio	10/84	19.95
Filemate	UL010	Cass/Dsk	2 CR&C/DD&C, X-BASIC	RS232, Printer	Small scale data base and mailing list		24.95
Amortization	UN020	Cass	CR&C,MiniMem	RS232, Printer	Calculates and prints repayment schedule		29.95
Data Base X	UN020	Dsk	DD&C,X-BASIC	RS232, Printer	Data base management,mail list		49.95
File Book IIE+	WE030	Cass	CR&C,X-BASIC		Record keeping up to 100 records		32.95
Income & Expense Spreadsheet II	WE030	Cass	CR&C,X-BASIC		Complete spreadsheet, 2 income & 50 expense categories		34.95
Expense Spreadsheet I	WE030	Cass	CR&C,X-BASIC		Complete spreadsheet, 52 expense categories		30.95
Income & Expense Spreadsheet IV	WE030	Cass	CR&C,X-BASIC		Professional-level accounting spreadsheet		39.95
Depreciation Schedule	WE030	Cass	CR&C,X-BASIC		Straight line, sum of digits, declining balance		12.95
78th Rule of Interest Amortization	WE030	Cass	CR&C,X-BASIC		Calculates rebate, interest earned & payoff		10.95
Loan Amortization Schedule	WE030	Cass	CR&C,X-BASIC	RS232, Printer	Complete amortization schedule & total interest paid		19.95
Income & Expense Spreadsheet IV	WE030	Cass	CR&C,X-BASIC	RS232, Printer	Professional level accounting spreadsheet		43.95
File Book IIE	WE030	Cass	CR&C,X-BASIC	RS232, Printer	Record keeping, prints labels etc		39.95
File Book III	WE030	Cass	CR&C,X-BASIC	RS232, Printer	Outputs sorted lists to screen, cassette, printer(labels)		39.95

Early Education

Beach Micro-Scene	AM010	Cass/Dsk	CR&C/DD&C, Logo I or II, MExp		Learn to read while creating beach scene		19.95/21.95
Mr. Frog	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Teaches letters and numbers		14.95/16.95
Barnyard Fun	AM010	Cass/Dsk	CR&C/DD&C		Memory game using graphics and music		14.95/16.95
Spelling Teacher	AM010	Cass/Dsk	CR&C/DD&C	SpSyn, SpEmu	Computer tests spelling skills		19.95/21.95
Spelling Corrector	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor		Correct spelling errors		16.95
Addition I	CA030	Cass	CR&C, X-BASIC		Beginners Addition		8.95
Subtraction I	CA030	Cass	CR&C,X-BASIC		Beginners Subtraction		8.95
Multiplication I	CA030	Cass	CR&C,X-BASIC		Beginners Multiplication		8.95
Division I	CA030	Cass	CR&C,X-BASIC		Beginners Division		8.95
Math Package I	CA030	Cass	CR&C, X-BASIC		Add/Sub/Mult/Div —Beginners		24.95
States and Capitals	CA030	Cass	CR&C	X-BASIC	Facts about the states		10.95
The Presidents	CA030	Cass	CR&C	X-BASIC	Presidental facts		10.95
Monster Math	CR010	Cass	CR&C		Math problems made fun. Grades 1-6		19.50
Spell Me	CR010	Cass	CR&C	SpSyn	Spelling program for grades 1-6		19.50
Space Times	CU010	Cass/Dsk	CR&C/DD&C		Multiplication tables		12.50
Kid-Spell	DR010	Cass	CR&C	SpSyn,TE II	Spelling drill program with user's own spelling words		9.95
Arithmetex	FA010	Cass	CR&C		Educational math game for young children		11.95
Meteor Alphabet	FO030	Cass	CR&C,X-BASIC	SpSyn	Ages 2-K, early keyboard training		14.95
Pipes	FU010	CC	Joysticks				44.95
Vocabulary Skills	GO020	Cass	CR&C		Elementary school spelling skills		14.95
Arithmetic Skills	GO020	Cass	CR&C		Basic arithmetic skills development		14.95
Teech	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Math drill		9.95
Planes	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Math drill		7.95
Learning Drill Program	HA010	Cass	CR&C		Q & A Drills		30.00
Fireball	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Arcade Math drill		14.95
Turn the Water Off!	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC	SpSyn	Personalized Spelling		14.95
Cells 1,2,3	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Animated CAI		19.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
The Heart, The Blood	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Animated CAI		Both for 19.95
Vyger	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC	SpSyn	Solar System Tour Simulation	10/83	19.95
Evolution	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Evolution simulation	10/83	19.95
World Conquest	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Political, economic simulation	11/83	19.95
The Learning Center	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		4 Games and file maker for personalized learning		39.95
Time Tutor	J0030	Cass	CR&C	X-BASIC	Teaches children to tell time		12.95
Talking Math Tutor —Addition/ Subtraction	JE010	Cass	CR&C	SpSyn, TE II	Drill young children in their addition and subtraction facts; grades 1-3. Program talks —if used with SpSyn and TE II		15.00
Talking Math Tutor—Multiplication	JE010	Cass	CR&C	SpSyn, TE II	Drill children in Multiplication facts. Grades 2-5. Program talks if used with SpSyn and TE II		15.00
Hangman	KI010	Cass	CR&C		Spelling exercise		10.95 for both
Memory	KI010	Cass	CR&C		Concentration game		
Ziggy Ball	KI010	Cass	CR&C, Joysticks		Ping-pong game		10.95 for both
Tic-Tac-Toe	KI010	Cass	CR&C		Tic-Tac-Toe game		
Numbers I	KI010	Cass	CR&C		Number recognition		10.95 for both
Numbers II	KI010	Cass	CR&C		Early number games		
Letters I	KI010	Cass	CR&C		Letter recognition		10.95 for both
Letters II	KI010	Cass	CR&C		Early alphabet games		
Macdonald's Farm	KI010	Cass	CR&C		Animal memory game		10.95 for both
Simon Says	KI010	Cass	CR&C		Tone/color echo game		
Bunny Count	KI010	Cass	CR&C		Count the bunnies		10.95 for both
Early Math	KI010	Cass	CR&C		Simple math tutorials		
Addition	KI010	Cass	CR&C		Flash card addition		10.95 for both
Subtraction	KI010	Cass	CR&C		Subtraction drills		
Multiplication	KI010	Cass	CR&C		Multiplication drills		10.95 for both
Division	KI010	Cass	CR&C		Division flash cards		
Shapes	KI010	Cass	CR&C		Shape recognition		10.95 for both
Directions	KI010	Cass	CR&C		Learn basic directions		
Hidden Letters	KI010	Cass	CR&C		Guess hidden letters		10.95 for both
Letters III	KI010	Cass	CR&C		Learn lower case letters		
Jack in the Box	KI010	Cass	CR&C		Computerized Jack		10.95 for both
America	KI010	Cass	CR&C		Demo tape		
Junior Hangman	KI010	Cass	CR&C		Hangman for 5-6 years		10.95 for both
Junior Memory	KI010	Cass	CR&C		Find matching shapes		
Glow Worm	KI010	Cass	CR&C, Joysticks		Hunt for food		10.95 for both
Humpty Dumpty	KI010	Cass	CR&C		Computerized puzzle		
Shoot the Moon	KI010	Cass	CR&C		Two spelling games		10.95 for both
Spellman	KI010	Cass	CR&C		Hangman with your words		
Math Test	KI010	Cass	CR&C		Classroom math test		10.95 for both
Factors	KI010	Cass	CR&C		Math practice drills		
Secret Number	KI010	Cass	CR&C		Guess the number game		10.95 for both
Mixer	KI010	Cass	CR&C		Unscramble the word		
Buried Treasure	KI010	Cass	CR&C		Find the treasures		10.95 for both
Egg Hunt	KI010	Cass	CR&C, Joysticks		Race to find eggs		
Xylophone	KI010	Cass	CR&C		Computer music maker		10.95 for both
Square Puzzle	KI010	Cass	CR&C		Solve the classic puzzle		
Colors	KI010	Cass	CR&C		Color recognition		10.95 for both
Number Names	KI010	Cass	CR&C		Relate digits and names		
Go Fish	KI010	Cass	CR&C		Fish catching game		10.95 for both
Sledding	KI010	Cass	CR&C, Joysticks		Race down the hill		
Hangmath	KI010	Cass	CR&C		Guess the math problem		10.95 for both
Three Fun Games	KI010	Cass	CR&C		Three number games		
Happy Math	MA030	Cass	CR&C	TE II,SpSyn	Addition, Subtraction		12.95
Counting With Coins U.S./Cdn./Mex.	MA030	Cass	CR&C		Teaches the value of money:4-7 years		12.95
Spelling and Phonics Tutor	MA030	Cass	CR&C, TE II, SpSyn		User defined reading and spelling exercises		12.95
Match'em 1, Match'em 2, Racing Letters	MI030	Cass/Dsk	CR&C/DD&C				14.95/17.95
Addition	MI030	Cass/Dsk	CR&C/DD&C				12.95/17.95
Subtraction	MI030	Cass/Dsk	CR&C/DD&C				12.95/17.95
Multiplicaton	MI030	Cass/Dsk	CR&C/DD&C				12.95/17.95
Division	MI030	Cass/Dsk	CR&C/DD&C				12.95/17.95
Alphabet Soup	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Teaches alphabet		14.95/17.95
I'm Hiding	MI070	CC	MBX ExpSys		Hide and Seek fun with bugs playing peek-a-boo in a crayon box		59.95
Sound Track Trolley	MI070	CC		MBX ExpSys	Pick up funny musicians and combine their tunes to form a band	11/83	49.95
Honey Hunt	MI070	CC		MBX ExpSys	Help our little bee find flowers but beware of spiders and dragonflies	11/83	49.95
Terry Turtle's Adventure	MI070	CC	MBX ExpSys		Tell Terry how to get home and watch him obey and talk back	11/83	59.95
Math Flash I	PA020	Cass	CR&C		Educational/color and music		9.95
Math Flash II	PA020	Cass	CR&C		Educational/color and music		9.95
Working with Fractions	PR020	Cass	CR&C		Teaching basic fractions or parts		6.50
Around the U.S.	PR020	Cass	CR&C		Teaching states and capitals, graphics		6.50
Whizkid	RO020	CC	Joystick		Teaches math and spelling in game format		39.95
Early Reading	SC020	CC			Word identification		58.95
Reading Rainbow	SC020	CC			Comprehension		58.95
Reading Fun	SC020	CC			Comprehension		58.95
Reading Cheers	SC020	CC			Word identification		58.95
Reading On	SC020	CC			Study&Research		58.95
Reading Adventures	SC020	CC			Comprehension		58.95
Reading Roundup	SC020	CC			Comprehension		58.95
Reading Trail	SC020	CC			Literary understanding		58.95
Reading Rally	SC020	CC			Comprehension		58.95
Reading Power	SC020	CC			Study & research		58.95
Reading Flight	SC020	CC			Study & research		58.95
Reading Wonders	SC020	CC			Literary understanding		58.95
Add & Sub 1	SC020	CC			Basic facts 1-9		44.95
Add & Sub 2	SC020	CC			Basic facts 1-18		44.95
Add & Sub 3	SC020	CC			2-3 digit		52.95
Numeration 1	SC020	CC			Place value—3 digit		44.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Numeration 2	SC020	CC			Place value—9 digit		44.95
Multiplication 1	SC020	CC			Basic facts		44.95
Multiplication 2	SC020	CC			1-digit numbers		52.95
Division 1	SC020	CC			Basic facts		44.95
Fractions 1	SC020	CC			Meaning of fractions		52.95
Fractions 2	SC020	CC			Like denominator		52.95
Decimals 1	SC020	CC			Meaning of decimals		52.95
Decimals 2	SC020	CC			Multiplications of decimals		52.95
Frog Jump	SC020	CC			Numbers and basic facts		39.95
Picture Parts	SC020	CC			Numbers and basic facts		39.95
Pyramid Puzzler	SC020	CC			Multiplication/Division		39.95
Star Maze	SC020	CC			Multiplication/Division		39.95
Number Bowling	SC020	CC			Decimal/Fractions/Percent		39.95
Space Journey	SC020	CC			Decimal/Fractions/Percent		39.95
THinc Graphics	T0010	Cass	CR&C	Joysticks	Screen drawing for children		14.95
THinc Names	T0010	Cass	CR&C		Teaches spelling with graphics		14.95
THinc Colors	T0010	Cass	CR&C		"Child-friendly" menu		14.95
THinc Colors, Shapes, Numbers	T0010	Cass	CR&C, X-BASIC		"Child-friendly" menu	10/83	19.95
THinc ABC's in 3D	T0010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Three-dimensional graphics learning	10/83	19.95
THinc Animals	T0010	Dsk	DD&C, X-BASIC, 32KMExp	Joysticks	"A child's first data base"	10/83	19.95
Quizmaster	TE060	Cass/Dsk	CR&C/DD&C		Enter up to 50 questions and answers and quiz yourself.		24.95
Addoids	TE060	Cass	CR&C	Joysticks	The fun way for youngsters to learn addition.		12.95
A + Spelling	TE060	Cass	CR&C,TE,SpSyn		Helps students in Grades 3-8 drill themselves on weekly spelling word lists.		19.95
Cliffman	UN020	Cass	CR&C, X-BASIC		Guess the word		9.95
Gallows	UN020	Cass	Cr&C		Word Recognition		9.95
Shark Counting	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd or X-BASIC		Counting Gulls		14.95
Early Counting Fun	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd, or X-BASIC		Counting Animals		14.95
Fish & Count	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd, or X-BASIC, Joysticks		Man fishing from boat		19.95
Basic Arithmetic	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd, or X-BASIC		Add, Sub, Mult, Div exercises		29.95
Addition	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd,		Addition using rabbits		14.95
Subtraction	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd,		Subtraction using rabbits		14.95
Talking Type	UP010	Cass/Dsk	CR&C/DD&C, X-BASIC, TE II, SpSyn		Spelling, word recognition		29.95
Keyboard Trainer	UP010	Cass/Dsk	CR&C/DD&C, SpSyn, SpEd or X-BASIC		Acquaint student with keyboard, flashing keys		NA
Wizard Quizzer	W0010	Cass	CR&C	SpSyn, TE II	Question & answer quiz game		10.00

Continuing Education/Personal Enrichment

Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Musician and Player	AM010	Cass/Dsk	CR&C/DD&C		Enter 3-part music and play it		19.95/21.95
Biorhythm	AR030	Cass/Dsk	CR&C/DD&C, TV	RS232, Printer	Screen print or hard copy of biorhythms		24.95
Atomic Structures	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Elements program		14.95
Basics of BASIC	CU010	Cass/Dsk	CR&C/DD&C		Beginners BASIC		24.95
Electronics	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Teach yourself	11/83	24.95
9900 Assembly	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Teach yourself	10/83	24.95
Famous Americans	CU010	Cass/Dsk	CR&C/DD&C		Program		12.50
Function Plot	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC				12.50
Math Functions	CU010	Cass/Dsk	CR&C/DD&C		In graphic form		25.00
Graphix	CU010	Cass/Dsk	CR&C/DD&C		Character generator		12.50
Personality Test	CU010	Cass/Dsk	CR&C/DD&C		Classifies traits		12.50
Space Speller	CU010	Cass/Dsk	CR&C/DD&C		Combination of Hangman and Invaders		12.50
Crime & Punishment	DE010	Cass	CR&C		Player gives sentences in criminal cases		16.00
Search and Seizure	DE010	Cass	CR&C,X-BASIC		Player tries to solve cases as Chief Detective		19.50
Learning Morse Code & Programmable Morse Code Practice	DY020	Cass/Dsk	CR&C/DD&C		Morse training programs.		22.00
Astronomy	EA010	Cass/Dsk	CR&C/DD&C, X-BASIC		Various astronomy titles		16.95/18.95
Mathematics	EA010	Cass/Dsk	CR&C/DD&C	X-BASIC	Various Mathematics Titles		15.00/19.00
Blackjack	EA010	Cass/Dsk	CR&C/DD&C, X-BASIC, MExp		Blackjack Strategy		21.95
Matrix Calculator	GE010	Cass	CR&C, X-BASIC		Matrix Manipulation		12.95
The Body	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Several programs on body systems	12/83	NA
Finger Fighter	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC		Typing tutor		14.95
Foreign Language Drill	KA010	Cass	CR&C	SpSyn	Lesson-by-lesson drill, scoring, rewards		25.00
Active Solar Heating/ Computer Math and Logic	KU010	Cass	CR&C		Teach binary Math and Logic		19.95
Capital Quiz	LO010	Cass	CR&C		Over 190 capitols all over world	10/15/83	10.00
Hebrew Alphabet Demo/Quiz	MI040	Cass	CR&C, X-BASIC		Hebrew reading skills		19.95
Hebrew Consonants & Vowels	MI040	Cass	CR&C, X-BASIC		Hebrew reading skills		19.95
Hebrew Syllables & "Words"	MI040	Cass	CR&C, X-BASIC		Hebrew reading skills		19.95
Jewish Time Machine-Part I	MI040	Cass	CR&C, X-BASIC		Jewish/Biblical history		19.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Jewish Time Machine-Part II	MI040	Cass	CR&C, X-BASIC		Jewish/Biblical history		19.95
Israel Archaeology Dig Game	MI040	Cass	CR&C,X-BASIC		Jewish/Biblical history		19.95
Israel Geography Game	MI040	Cass	CR&C,X-BASIC		Israel Geography		19.95
Understanding the Sh'ma (4 Programs)	MI040	Cass	CR&C,X-BASIC		Hebrew Vocabulary		44.95 Any Three for 49.95
Oil Psi	MI090	Cass	CR&C		ESP simulation game		free w/ Psi Lab
Stock Market	MI090	Cass	CR&C		ESP simulation game		free w/ Psi Lab
Colormatch	MI090	Cass	CR&C		ESP test		free w/ Psi Lab
Slotmatch	MI090	Cass	CR&C		ESP test		free w/ Psi Lab
Free PK	MI090	Cass	CR&C		Psychokinesis test		free w/ Psi Lab
Blackjack	MI090	Cass	CR&C		ESP simulation game		free w/ Psi Lab
Randocheck	MI090	Cass	CR&C		Statistical test		Free w/ Psi Lab
Confidence	MI090	Cass	CR&C		ESP test		Free w/ Psi Lab
Speak To Me	MI090	Cass	CR&C		Psi-mediated conversation		free w/ Psi Lab
Stat tests	MI090	Cass	CR&C		Statistical tests		free w/ Psi Lab
Psi Lab	MI090	Cass	CR&C		All of the above		29.95 + shipping
Psychometric	PA010	Cass	CR&C		8-part mental health inventory		8.95
World Capitals	PA020	Cass	CR&C		Color graphics and quiz		9.95
States and Capitals	PA020	Cass	CR&C		Educational/color and music		9.95
Great Inventions	PA020	Cass	CR&C		Educational/color and music		9.95
Word Challenge	PA020	Cass	CR&C		Educational/color and music		9.95
Advanced Word Challenge	PA020	Cass	CR&C		Educational/color and music		9.95
Color Personality Test	PE020	Cass	CR&C		Personality traits		10.00
Biorhythm	PE020	Cass	CR&C		Biological ups & downs		10.00
Color Monitor Align	PR020	Cass	CR&C		Aids in TV or monitor alignment		6.50
Workbook of Electronics	PR020	Cass	CR&C		Electronic self-help		6.50
Biorhythm and You	PR020	Cass	CR&C	Printer	Plotting biorhythmic flow		6.50
Typo	RO02C	CC			Teaches spelling, typing and keyboard		39.95
Morse Tutor	SI010	Cass	CR&C,X-BASIC		Morse Code learning aid		16.45
Biorhythm	SO020	Cass/Dsk	CR&C/DD&C	Printer	Prints a one-month biorhythm		5.95
Personality Analyzer	SO040	Cass	CR&C		Analyze yourself and others		24.95
Unitiger	TE050	Disk	DD&C, X-BASIC, 32K MExp	RS232, Printer	Comprehensive dictionary of scientific units & conversion factors; dimensional analysis conversion for technical reports		49.95
Algebra I	TE060	Cass/Dsk	CR&C/DD&C		All 1st year Algebra topics are covered.		59.95
Geometry	TE060	Cass/Dsk	CR&C/DD&C, X-BASIC		All 1st year Geometry topics are covered.	1/84	59.95
Algebra II	TE060	Cass/Dsk	CR&C/DD&C, X-BASIC		All 2nd year Algebra topics are covered.	5/84	59.95
Ghost Writer	VI010	Cass/Dsk	CR&C/DD&C		Creates stories		14.95

Teaching and Administrative Aids

Teachers Record	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, RS232, Printer		Name, grade storage without expansion		24.95
Teachers Record II	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, X-BASIC, Printer/RS232, 32KMExp		Expanded name, grade storage and processing		44.95
Firefighters Hydraulics Course	FO010	Cass/Dsk	CR&C/DD&C		Specialized education course for firefighters		30.00/35.00
The Plotter	IN010	Cass/Dsk	CR&C/DD&C	X-BASIC	Graphing program		NA
Teachers Helper	IN020	Cass/Dsk	CR&C/DD&C, X-BASIC	X-BASIC, RS232, Printer	Gradebook, crosswords, word find	10/83	19.95
Rapid Read	MA010	Cass	CR&C	X-BASIC	Reading drill—words, phrases, sentences, up to 2500 words per minute.		12.95
Turtles on T.V.	MI080	Video Beta & VHS	V.C.R		Logo procedures on video with voice		60.00
Test Design	PRO20	Cass	CR&C		Making up multi-choice test		6.50
Student Data Recorder	SC020	CC					360.00
Attendance Recorder	SC020	CC					360.00
Class Data Recorder	SC020	CC					275.00
School Mailer	SC020	CC					350.00
Payroll Assistant	SC020	CC					350.00
Personnel Data	SC020	CC					435.00
Activity Accountant	SC020	CC					275.00
Accounting Assistant	SC020	CC					465.00
Salary Planner	SC020	CC					275.00
Property Manager	SC020	CC					435.00
LOGO Flip Chart	SC020	CC					19.95

Entertainment

Checkers	AL010	Cass/Dsk	CR&C/DD&C, X-BASIC, PEB	SpSyn	Plays ancient game of Checkers in color with optional speech		11.95/12.95
Space Battle 2056	AM010	Cass/Dsk	CR&C/DD&C		Command earth fleet		14.95/15.95
Land on Mars	AM010	Cass/Dsk	CR&C/DD&C		Pilot Martian Lander		12.95/14.95
Laser Shield	AM010	Cass/Dsk	CR&C/DD&C		Defend cities with laser		14.95/16.95
Ski	AM010	Cass/Dsk	CR&C/DD&C		Ski down slopes		14.95/16.95
Wizard's Dominion	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Navigate passages, fight ogre, find gold		19.95/21.95
Meteor shower	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Propel spacecraft through meteors		9.99/11.95
Bomb Squad	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Disarm loudly ticking bomb		14.95/16.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
3-D Maze	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Explore 3-d mazes and find exit		14.95/16.95
Haunted House	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Explore house, find ruby, avoid monsters		14.95/16.95
Fun House	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Make your way out of fun house		14.95/16.95
Miner 49er	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Find 3 treasures in haunted mine		14.95/16.95
Stone Age	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Find time machine and teleport to 20th century		14.95/16.95
Aqua Base	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Destroy evil laser base in 90 minutes		14.94/16.95
The Four Vedas	AM010	Cass/Dsk	CR&C/DD&C, X-BASIC		Find ancient books		14.95/16.95
Colorado Slalom	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Worms & Bugs	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Crunchman	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Destroy Klatu	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Katzenmouse	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Bonkers II	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Zombies Galore	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Interstate '80'	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Looney Lander	AR010	Cass/Dsk	CR&C/DD&C		Action game		7.00
Robothello	AR010	Cass/Dsk	CR&C/DD&C		Strategy game		7.00
Bombscare	AR010	Cass/Dsk	CR&C/DD&C		Strategy game		7.00
Cockroaches & Bees	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Klingon Encounters	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Snomobile Derby	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Galactic Guardian	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
L. A. Freeway	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Space Invoiders	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Slurvian Suicide Squad	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Martian Missile Mission	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Air Raid	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Bull Frog	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
ICBM Intercept	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Rocket-Docket	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Moon Raker	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Warlords of Xorbitron	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		10.00
Medieval Siege	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Two-player game		10.00
The Red Baron	AR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Two-player game		10.00
Klingn Attack	AR010	Cass/Dsk	CR&C/DD&C, MiniMem or MExp with X-BASIC or EdAss		Action game		15.00
Klaatu Bombardment	AR010	Cass/Dsk	CR&C/DD&C, MiniMem or MExp with X-BASIC or EdAss		Action game		15.00
Jungle-Man	AR020	Cass	CR&C, X-BASIC	Joystick	Jungle arcade action		14.95
Qube-Bert	AR020	Cass	CR&C, X-BASIC		Jump from cube to cube		14.95
Fire-Chopper	AR020	Cass	CR&C, X-BASIC	Joystick	Save people and put out fires		14.95
Arcade Casino I	AR020	Cass	CR&C, X-BASIC	Joystick	Progressive slots and roulette		9.95
Arcade Casino II	AR020	Cass	CR&C, X-BASIC	Joystick	Blackjack and Hi-Lo craps		8.95
Star Patrol	AR020	Cass	CR&C, X-BASIC		3-D split screen space fight		7.50
Death Con I	AR020	Cass	CR&C, X-BASIC	Joystick	Save U.S. from nuclear war		12.95
Top-Rank	AR020	Cass	CR&C, X-BASIC		Boxing		12.95
Saturn Rescue	AR020	Cass	CR&C, X-BASIC	Joystick	Save men and shoot meteors		9.95
Kamikaze Ace	AR010	Cass	CR&C, X-BASIC	Joystick	Fly Kamikaze mission		9.95
Zormax II	AR020	Cass	CR&C, X-BASIC	Joystick	3-D planet cruiser	11/83	7.50
O.K. Shoot-Out	AR020	Cass	CR&C, X-BASIC	Joystick	Out-draw crooks		8.95
Junk-Man	AR020	Cass	CR&C, X-BASIC	Joystick	Catch garbage and avoid rats		14.95
Shooting Arcade	AR020	Cass	CR&C, X-BASIC	Joystick	Shoot targets	11/83	14.95
Car Jamming	AR020	Cass	CR&C, X-BASIC	Joystick	Bump cars off road	11/83	14.95
Mars Miner	AR020	Cass	CR&C		Blow up bases in Mars	11/83	9.95
Bowling	AR020	Cass	CR&C, X-BASIC		Bowling	11/83	10.95
Hotslot	AY020	Cass	CR&C	Joysticks	4 Wheel Slot		14.95
MiniGolf	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC		Miniature Golf		12.95
BlackJack	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC		Casino-style Blackjack		12.95
Xorkle	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC		Dice game for up to 6		12.95
MiniGolf II	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Modem		Game for 2 computers on the telephone		12.95
Xorkle II	BE010	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Modem		Game for 2 computers on the telephone		12.95
Eggbert	CA020	Cass/Dsk	CR&C/DD&C, Joysticks, Mini-Mem, 32KMExp		Pyramid maze game		19.95
Cobra Command	CA020	Cass/Dsk	CR&C/DD&C, Joysticks, Mini-Mem, 32KMExp		Attack helicopter game		19.95

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Pulsar	CA020	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Space mining game		14.95
Sky Baron	CA020	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Bi-plane rescue game		14.95
Think & Remember	CA040	Cass	CR&C, X-BASIC		Like TV show *Concentration*		14.95
Jackpot	CA040	Cass	CR&C, X-BASIC		Video slot machine game		14.95
Trivia Mania	CA040	Cass	CR&C	X-BASIC	Trivia questions and answers		10.95
Starprobe 99	CH010	Cass/Dsk	CR&C/DD&C		9-screen, skill game		17.95
Wallaby	CH010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	4-screen skill game		17.95
3-D Stalkers	CH010	Cass/Dsk	CR&C/DD&C	Joysticks	2-person strategy game		17.95
Horrors!	CH010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	16 playing combinations, skill game		17.95
MU Outpost	CH010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Action game		17.95
Draw Poker	CH010	Cass/Dsk	CR&C/DD&C		Card game		17.95
Game of 50 States	CH010	Cass/Dsk	CR&C/DD&C	SpSyn	States & capitals		17.95
Asteroid Defender	CO010	Cass	CR&C, X-BASIC, Joysticks, 16K Console	SpSyn	3-D space game		14.95
Shooting Gallery	CO010	Cass	CR&C, X-BASIC, Joysticks, 16K Console	SpSyn	Arcade shooting game		14.95
Atom	CU010	Cass/Dsk	CR&C/DD&C		Strategy search		12.50
Backgammon	CU010	Cass/Dsk	CR&C/DD&C		Classic game		12.50
Bio	CU010	Cass/Dsk	CR&C/DD&C		Classic game		12.50
Blackjack	CU010	Cass/Dsk	CR&C/DD&C		Classic game		12.50
Broadsides	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Strategy game		12.00
Casino Slots	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC and 32KMExp		Written in Assembly Language	11/83	12.50
Color Breaker	CU010	Cass/Dsk	CR&C/DD&C		Color combo guessing		12.50
Color Doodl	CU010	Cass/Dsk	CR&C/DD&C		Etch-A-Sketch		12.50
Cosmic Quest	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Deep space journey	11/83	14.95
Evacuation Run	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Strategy game		12.50
Flip	CU010	Cass/Dsk	CR&C/DD&C		Version of OTHELLO		14.95
Galactic Battle	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Defend against invaders		12.50
Hassles	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC,		Strategy game		12.00
Space Voyage	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC and 32KMExp		Lander (in Assembly Language)	11/83	12.50
Rabbit Hunt	CU010	Cass/Dsk	CR&C/DD&C		Strategy game		11.50
Sub	CU010	Cass/Dsk	CR&C/DD&C, X-BASIC		Action game		12.50
Super Pin-Ball	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC and 32KMExp		Action game	11/83	12.50
ASW Tactics	DO010	Cass	CR&C		Search and destroy game		14.95
Astro Mouse	DO010	Cass	CR&C		Space battle		9.95
Zenith One	DO010	Cass	CR&C		Space battle		9.95
Galactic Battle	DO010	Cass	CR&C, X-BASIC	Joysticks	Space battle		16.95
Space War	DO010	Cass	CR&C	Joysticks	Space battle		9.95
Horse Racing	DO010	Cass	CR&C, X-BASIC	Joysticks	Horse race		16.95
Orbiter	DO010	Cass	CR&C, X-BASIC	Joysticks	Satellite rendezvous		16.95
Heros	DA010	Cass/Dsk	CR&C/DD&C, X-BASIC		4-screen action adventure		19.95
Tanx	DA010	Cass/Dsk	CR&C/DD&C, X-BASIC		War game		17.95
Castle Blarney	DA010	Cass/Dsk	CR&C/DD&C, X-BASIC		3-screen gold hunting adventure		19.95
Wyvern	DA020	Cass/Dsk	CR&C/DD&C, X-BASIC, Joystick#2		Adventure/action game		14.95/16.95
Lost Patrol	DA020	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick#1	Adventure/action game		13.95/15.95
Mad Dog I	DA020	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick#1	Fast action game		13.95/15.95
Mad Dog II	DA020	Cass/Dsk	CR&C/DD&C, MiniMem	Joystick#1	Very fast action game		15.95/17.95
BaseBall Trivia	DA020	Cass/Dsk	CR&C/DD&C, X-BASIC		Trivia question game		8.95/10.95
Tic-Tac-Toe	DE030	Cass	CR&C, Monitor		1 or 2 players, many degrees of difficulty		14.95
Medieval Adventure	DO010	Cass	CR&C, X-BASIC		Graphical adventure		18.00
Egyptian Adventure	DO010	Cass	CR&C, X-BASIC		Graphical adventure		18.00
Sundial Island I&II	DO010	Cass	CR&C, X-BASIC		Graphical adventure		24.00
Sundial Island I&II	DO010	Cass	CR&C		Graphical adventure		24.00
Ulysses Mansion	DO010	Cass	CR&C		Graphical adventure		18.00
Dow-4 Gazelle	DO030	Cass/Dsk	CR&C/DD&C, Joystick		Flight simulator		30.00
Quimbee	DY020	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Casino-type dice game		20.00
Zoot Shoot	EA020	Cass	CR&C, X-BASIC	Joysticks	Arcade speed space gunfight with Zootians (aliens). Use sunsight to aim phasers.		17.00
Cosmic Coup	EA020	Cass	CR&C		A stategic game of space combat. Use lasers, bombs & shields to win 6 planets.		17.00
Deflectors	EA020	Cass	CR&C		Search a grid for hidden deflectors		15.00
Backgammon for Two	EA020	Cass	CR&C		Two-player game; with full-color graphics		17.00
Vadering	EA020	Cass	CR&C	Joysticks	Protect your starbase with laser blasts		10.00
Copycats	EA020	Cass	CR&C	Joysticks	1-8 players try to remember a series of tones and lights.		10.00
Cryptic Code	EA020	Cass	CR&C		Classic code-breaking game for 1-6 players		10.00
Easydrive 75	EA020	Cass	CR&C	Joysticks	Drive a race car on I-75.		15.00
Easypong	EA020	Cass	CR&C	Joysticks	For children; many variations		7.00
Easytag	EA020	Cass	CR&C	Joysticks	Two-player game—chase a friend in a maze		7.00

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PAK/I	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks	SpSyn	Froggy, Baseball, Gorfia, Hangman, TTT		26.95
PAK/II	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Artillery, De-Cypher, Flip Checkers, P 15		26.95
PAK/III	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Kong, Bouncer, Romeo		26.95
Froggy	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Ten lanes, five logs		9.95
Extended Baseball	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Multi-base, multi-player, extra innings		9.95
Gorfia Pestulitis	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Shoot aliens—laser sights or space mines		9.95
Extended Hangman	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC	SpSyn	Music, color, graphics, 580 words		9.95
Tic-Tac-Toe	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC	SpSyn	Quick decisions by computer, 4 levels		9.95
Artillery	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC		Ballistics algorithm with wind factor		9.95
De-Cypher	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC		50 messages or add your own		9.95
Puzzle 15	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC		Smooth action, counts moves; replay		9.95
Flip Checkers	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		2 player: 1 vs comp., or comp. vs comp.		9.95
Kong	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		6 different screens, graphics		15.00
Bouncer	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		6 screens, action		15.00
Romeo	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Desert sands, stream with alligators, sharks and cavern		15.00
ABM Control	FA010	Cass	CR&C, X-BASIC, Joysticks		Defend your cities against a nuclear attack with 3 ABM Bases		11.95
Drac Man	FA010	Cass	CR&C, X-BASIC	Joysticks	Lead the count through a maze to the energizers		11.95
Castle Nova	FA010	Cass	CR&C	Joysticks	Lead Casanova through the maze of Castle Nova		7.95
Computerized Crayo	FO030	Cass	CR&C		Fun graphics program		14.95
Keno	FR010	Cass	CR&C		Nevada style Keno		12.00
Draw Poker	FR010	Cass	CR&C		Machine style Draw Poker		12.00 (Both for 20.00)
Ambulance	FU010	CC	Joystick				44.95
Ant Colony	FU010	CC	Joystick				44.95
Cave Creatures	FU010	CC	Joystick				44.95
Driving Demon	FU010	CC	Joystick				44.95
Saint Nick	FU010	CC	Joystick				44.95
Crisis Mountain	FU010	CC	Joystick				44.95
Trashman	FU010	CC	Joystick				44.95
Astroblitz	FU010	CC	Joystick				44.95
Bells, Bars, and Ratchets	GE010	Cass	CR&R	Joysticks	Slot machine, 1 or 2 players		12.95
Derby Day	GE010	Cass	CR&C, X-BASIC		Horse race, 1 to 4 playes		12.95
Eagle Base	GE020	Cass	CR&C, X-BASIC	Joysticks	Strategy and skill space game		15.95
Super Frog	GE020	Cass	CR&C, X-BASIC	Joysticks	Fast paced frog game		15.95
Slither	GE020	Cass	CR&C, X-BASIC	Joysticks	Multi-level maze game		15.95
Pirate's Gold	GE020	Cass	CR&C, X-BASIC	Joysticks	Dive for lost treasure	11/83	15.95
Alien Attack	GE020	Cass	CR&C, X-BASIC	Joysticks	Space battle	11/83	15.95
Star Destroyer	GO020	Cass	CR&C		Arcade spaceship game		9.95
Submarine Search	GO020	Cass	CR&C		Arcade search and destroy game		12.95
Sea Battle	GO020	Cass	CR&C		Two-player board strategy game		12.95
Motorcycle Jump	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Jump motorcycle over ramp		6.95
South Pacific	GR010	Cass/Dsk	CR&C/DD&C		Submarine hunt game		12.95
Country Roads	GR010	Cass/Dsk	CR&C/DD&C, Joysticks	SpSyn	Maze game		12.95
Six Pack #1	GR010	Cass/Dsk	CR&C/DD&C		Variety game pack		14.95
Super Boggler	GR010	Cass/Dsk	CR&C/DD&C	Joysticks	Strategy game		12.95
Jackpot	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Slot machine game		14.95
Zygon	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Space game		14.95
Black Bomber	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Catch-the-bomb game		14.95
U.X.B	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Defuse-the-bomb game		14.95
Froggie	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Arcade game		12.95
Omega Force	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Arcade game		12.95
Berzerkle	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Treasure hunt game		12.95
Stock Investments	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC		Similar to stock ticker board game		9.95
Parachute	GR010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Save the city game		9.95
Hangman Plus	GR010	Cass/Dsk	CR&C/DD&C		Hangman		6.95
Invader Plus	GR010	Cass/Dsk	CR&C/DD&C		Arcade game		6.95
Tic-Talk-Toe	GR010	Cass/Dsk	CR&C/DD&C	SpSyn	Tic-Tac-Toe		12.95
T-I-Q	GR010	Cass/Dsk	CR&C/DD&C		Strategy game		11.95
Life	GR010	Cass/Dsk	CR&C/DD&C		Cell-colony simulation		11.95
Crillion Defender	GR020	Cass	CR&R, X-BASIC	Joysticks	Protect Crill from invading aliens.		14.95
Dimensional Tank Duel	GR020	Cass	CR&C, X-BASIC	Joysticks	Tank duel in solid 3-D multi-board space		14.95
Monster Mania	GR020	Cass	CR&C, X-BASIC	Joysticks	The game of gourmet village eating	11/83	14.95
Evolution	GR020	Cass	CR&C	X-BASIC	Highly graphic version of Conway's life.		6.95
GB Tank Wars	GR020	Cass	CR&C, Joysticks		1 or 2 players tank battle; you select terrain.		9.95
Shrink	GR020	Cass	CR&C	SpSyn, TE II	Famous shrinks help with your problems		12.95
Star Fighter	GR020	Cass	CR&C, Joysticks		Deadly black holes await in this 2 player battle.		9.95
Oracle	GR020	Cass	CR&C		The ancient Tarot foretells your future.	11/83	9.95
Andromea	I0010	Cass	CR&C, X-BASIC		Space game		20.00
Time Tunnel	I0010	Cass	CR&C, X-BASIC	SpSyn	Adventure game	NA	20.00

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Finch Pinch	IN010	Cass/Dsk	CR&C/DD&C, X-BASIC		Help Santa escape from the Finches.		NA
The Story of " "	IN010	Cass/Dsk	CR&C/DD&C	X-BASIC	Personalized children's story		NA
Aesop's Fables	IN010	Cass/Dsk	CR&C/DD&C	X-BASIC	Fables for children		NA
Midway Arcade	IN010	Cass/Dsk	CR&C/DD&C, X-BASIC		Circus shoot'em up		NA
Welcome to Hell!	IN050	Cass	CR&C	Joysticks	Animated adventure		12.50 U.S., 14.00 Can.
Mad Race	IN050	Cass	CR&C, Joysticks		Strategy game for 2		9.50 U.S., 11.00 Can.
Space Defender	IN050	Cass	CR&C, Joysticks		Arcade-type space game		9.50 U.S., 11.00 Can.
Maze Chase	IN050	Cass	CR&C, Joysticks		Arcade-type maze game		9.50 U.S., 11.00 Can.
The Black Market	J0010	Cass	CR&C, X-BASIC	Joystick			15.95
Atlantic City Games—Blackjack, Slot Machine	JE010	Cass	CR&C	Joystick	Casino-style accurate simulation of games as played in casino.		15.00
Atlantic City Games—Craps, Roulette	JE010	Cass	CR&C, X-BASIC		Casino-style accurate simulation of games as played in casino.		15.00
Space Salvo	JE010	Cass	CR&C, X-BASIC		Aliens attack New York. Coordinates are used to locate and destroy aliens		12.00
Cockroach Races	JE010	Cass	CR&C	X-BASIC	Bet on cockroaches running obstacle courses. 2 versions, BASIC and X-BASIC.		9.00
Fish	KU010	Cass/Dsk	CR&C/DD&C		Fishing simulation game		9.95
Data Rescue	KU010	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Arcade space game		10.95
Scepter of Kzirgla	KU010	Cass	CR&C		Graphics adventure		12.95
Snakepak	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Tankpak	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Reporters	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Minesweepers	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Weather Wars	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Dominoes, v.4	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Kingtrapper	L0010	Cass	CR&C	Jpysticks	Game, programming guide		10.00
Haunted House	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Divers, Railroads	L0010	Cass	CR&C	Joysticks	Game, programming guide		10.00
Youngpak I	L0010	Cass	CR&C	Joysticks	Game, programming guide, 5 games		10.00
Youngpak II	L0010	Cass	CR&C	Joysticks	Game, programming guide, 5 games		10.00
Multi-Man	L0010	Dsk	DD&C, X-BASIC	Joysticks	Multi-player Munch	11/83	15.00
Multi-Vaders	L0010	Dsk	DD&C, X-BASIC	Joysticks	Multi-player invaders	11/83	15.00
Baseball	L0010	Dsk	DD&C, X-BASIC	Joysticks	Actual player stats game	11/83	20.00
Biorythyms	MA010	Cass	CR&C		Biorythm analysis of compatibility	12/83	8.95
ArTist	MA020	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC, 32KMExp or EdAss, Joystick		Bit map painting easel		N/A
Bomber	MA020	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC, 32KMExp or EdAss, Joystick		Arcade type game		N/A
Imlost	MA020	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC, 32KMExp or EdAss, Joystick		Maze game		N/A
Boxer	MA020	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC, 32KMExp or EdAss, Joystick		2 player arcade game		N/A
Cat and Mouse	MA020	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC, 32KMExp or EdAss, Joystick		Arcade type game		N/A
Sky-Diver	MA030	Cass	CR&C, X-BASIC		Skydiving game for up to 4 players		19.95
Hang-Glider Pilot	MA030	Cass	CR&C, X-BASIC		Game/fight trainer		19.95
Devil Craze	MA030	Cass	CR&C, X-BASIC	Joysticks	Recognition-response game re. left/right		17.95
Birthday Party	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Cake, candles, music, big letters		10.00/12.50
Christmas Card	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Xmas tree, music, personalized greetings		10.00/12.50
Battleship	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Player vs. Computer, 5 ships each		10.00/12.50
1984	MI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Elude thought police, escape		15.00/17.50
B-1 Nuclear Bomber	MI020	Cass	CR&C		Introductory war game		16.00
Jotto	MI030	Cass/Dsk	CR&C/DD&C				12.95/17.95
Pow Wow and Cornerbound	MI030	Cass/Dsk	CR&C/DD&C		2 games		14.95/17.95
Hobbyist Game Pac I	MI050	Cass	CR&C, X-BASIC, Joysticks		12 BASIC/X-BASIC action, memory & card games		9.95
Hobbyist Game Feature I; The 24-Hour Invasion	MI050	Cass	CR&C, Joysticks, MiniMem		Game, fight aliens day, evening, night & morning. Color, graphics & sound		6.95
Hobbyist Game Pac II	MI050	Cass	CR&C, X-BASIC, Joysticks		12 BASIC & X-BASIC action, puzzle and card games	2/84	9.95
Battle Over Titan	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Space game		14.95/17.95
The Pharaoh's Tomb	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC		Treasure hunt		14.95/17.95
Casino Blackjack	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC		Blackjack instruction		14.95/17.95
Blackbeard's Treasure	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Diving game		14.95/17.95
The Crazy Fun House	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Multi-maze		14.95/17.95
Night Mission	MI060	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Helicopter destroy and rescue		14.95/17.95
Championship Baseball	MI070	CC	MBX ExpSys		Computerized Baseball	11/83	59.95
Meteor Belt	MI070	CC		MBX ExpSys	Let your computer co-pilot warn you of enemy ships in this daring space duel	11/83	49.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Space Bandit	MI070	CC		MBX ExpSys	Snatch up space crystals in a 3-D maze, chased by deadly droid guards	11/83	49.95
Big Foot	MI070	CC		MBX ExpSys	Dodge boulders and eagles to climb high and capture Bigfoot	11/83	49.95
Super Fly	MI070	CC		MBX ExpSys	Destroy alien spiders before the next batch hatches and gets you	11/83	49.95
Sewermania	MI070	CC		MBX ExpSys	Defuse a time bomb in a sewer filled with killer rats and alligators	11/83	49.95
Death Drones	MO010	Cass/Dsk	CR&C/DD&C, BASIC, X-BASIC	Joystick	Your city is under attack by relentless alien drones (action game)		14.95
Cavern Quest	MO010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick	Fast action game of skill and strategy		19.95
Moonbeam Express	MO010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick	Interactive, multiple screen, multi-level game of skill and strategy		19.95
Garbage Belly	MO010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick	Help the Garbage Belly gobble up the ripe garbage in a field of garbage pails		19.95
Moonvasion	MO010	Cass/Dsk	CR&C/DD&C BASIC, X-BASIC	Joystick	Alien starfighters are attacking your moonbase, fast-paced		14.95
Strike Force	MO010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick	True 3-D graphics, sound effects		19.95
Astromania	MO010	Cass/Dsk	CR&C/DD&C, X-BASIC	Joystick	Are you fast enough for the unforgiving Zircon Droids? Fast-paced		19.95
Krazy Kong	N0010	Cass	CR&C, X-BASIC	Joystick	Like Donkey Kong		18.95
Hit n' Run	N0010	Cass	CR&C		Mafia chase game		18.95
Super Munch	N0010	Cass	CR&C	X-BASIC, Joystick	Like Pac-Man		18.95
Laser Blaster	N0010	Cass	CR&C, X-BASIC	Joystick	Planet defense game		18.95
Poultry Pusher	N0010	Cass	CR&C, X-BASIC	Joystick	Set chicken across road		18.95
Air Combat	N0010	Cass	CR&C	X-BASIC, Joystick	Dogfight in the air		18.95
Tank Combat	N0010	Cass	CR&C, X-BASIC	Joystick	Fighting tanks		18.95
Hen-Pecked	NA010	CC			Arcade game		37.50
Princess and Frog	NA010	CC			Arcade game		37.50
Anteater	NA010	CC			Arcade game		37.50
Topper	NA010	CC			Arcade game		37.50
Attack Man	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	Joysticks	Fast action game		19.95/23.95
Cross Country Car Rally	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp		Fast action game		19.95/23.95
Super Frogger	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	Joysticks	Fast action game		19.95/23.95
3-D Star Trek	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	Joysticks	Fast action game		14.95/18.95
Lunar Lander	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp		Fast action game		14.95/18.95
Tank	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	Joysticks	Fast action game		14.95/18.95
Killer Caterpillar	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	Joysticks, Trak Ball	Assembly language game		29.95/34.95
Addvance	NO020	Cass	CR&C		Computerized game board		13.00
Ant Wars	NO020	Cass	CR&C		Insect world combat		18.00
Bankroll	NO020	Cass	CR&C, X-BASIC		Learn how to profit in uncertain times with this financial world simulation		18.00
Cars & Carcasses II	NO020	Cass	CR&C		Game of driving skill		10.00
Cosmopoly	NO020	Cass	CR&C, X-BASIC		Space barons. Buy planets and moons and fortify your bases for the war to come		15.00
Flatland	NO020	Cass	CR&C, X-BASIC	Joystick	Simulation of life in two dimensions —your TV screen becomes Flatland.		18.00
Hordes	NO020	Cass	CR&C, Remote Switch on Cass		Your armies attack and conquer territories, continents, and finally the entire world		18.00
Khe Sanh	NO020	Cass	CR&C		Guerilla war in Viet Nam		18.00
Laser Tank	NO020	Cass	CR&C, X-BASIC	Joystick	Chase your computer controlled opponent tank and engage in the battle zone		15.00
Maze of Ariel	NO020	Cass	CR&C		A game of skill and dexterity. Fight a dragon in a random maze!		13.00
Ophyss	NO020	Cass	CR&C	Joystick	Guide opposing snakes through mazelike Serpentarium to catch food on the hop		13.00
Planet Troopers	NO020	Cass	CR&C, X-BASIC, Texas Light Shooter		Follow the clues to locate the tunnels of the alien hive. Fight your way to the Queen's chamber		13.00
Skeeti	NO020	Cass	CR&C, X-BASIC, Texas Light Shooter		The fastest guns on earth would have difficulty with this ultimate target game		13.00
Sengoku Jidai	NO020	Cass	CR&C		Medieval Japanese Warfare		18.00
Ships!	NO020	Cass	CR&C		Two seagoing conflict simulations: Mediterranean Piracy, Engagement Biscay.		15.00
Starship Pegasus	NO020	Cass	CR&C		The adventure of contacting extra-terrestrial intelligence		18.00
Tickworld	NO020	Cass	CR&C		Game of capture and escape		13.00
Tower	NO020	Cass	CR&C, X-BASIC		Air-traffic controller		18.00
Treasure Trap	NO020	Cass	CR&C		Graphic Adventure Game		13.00
Waldoball	NO020	Cass	CR&C, X-BASIC		Strategy Soccer, Androids vs. robots in this mechanized sport of tomorrow		13.00
Winging IT	NO020	Cass	CR&C		Fly your own private plane in this simulator		15.00
Crosses	NO020	Cass	CR&C		Game of Juxtaposition		10.00
99'Vaders	NO020	Cass	CR&C	Joysticks	Fight back waves of galactic kamikaze aliens from the last outpost on Earth		15.00
Crossums	OA010	Cass/Dsk	CR&C/DD&C, X-BASIC		Cross-number game		14.95
Grab the Money and Ski	P0010	Cass	CR&C, X-BASIC, Joysticks		Ski down a treacherous mountain collecting bags of money		14.95
Greenies From Cygnus	P0010	Cass	CR&C, X-BASIC, Joysticks		Shoot down UFO's before they bomb your cities, 1 player		14.95
Treasure Hunter	P0010	Cass	CR&C, X-BASIC, Joysticks		Dive into treacherous water for treasure, 1 player		14.95
PTB Car Race	P0010	Cass	CR&C, X-BASIC, Joysticks		Race against another player and computer cars		14.95
PTB Golf	P0010	Cass	CR&C, X-BASIC		Golf with all clubs against all hazards		14.95
Party Trivia	PA020	Cass	CR&C		50's TV, sports quiz		9.95
Blackjack	PA020	Cass	CR&C		Card game 2 players and dealer		9.95
Space Rescue	PA020	Cass	CR&C		Save space travellers stranded on Pluto		9.95
Quest for the Sword	PE010	Cass	CR&C		Text adventure		18.00
Aron's Revenge	PE010	Cass	CR&C		Text adventure, sequel to QUEST		17.95

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Conquest in Space	PE010	Cass	CR&C, X-BASIC		Graphical strategy game		18.00
Assault Force	PE010	Cass	CR&C, X-BASIC		Graphical strategy game		15.00
Balloon Voyage	PE010	Cass	CR&C, X-BASIC		Arcade game		17.00
Tarot Card Reading	PE020	Cass	CR&C		Fortune telling		15.00
Quarter Horse Futurity	PE020	Cass	CR&C		Horse race game		12.00
Bluegrass Sweepstakes	PE040	Cass	CR&C		Graphic horse race		14.95
Decathlon	PE040	Cass	CR&C	Joysticks	10 Olympic events		14.95
Up Periscope	PE040	Cass	CR&C,X-BASIC		Submarine on patrol		14.95
Snow Trek	PE040	Cass	CR&C		Snowmobile fun		14.95
Goblin's Revenge	PE040	Cass	CR&C		Chase through a maze		14.95
Sorcerer's Apprentice	PE040	Cass	CR&C,X-BASIC		Build a witch's brew	10/83	14.95
Family Game Pak I	PE040	Cass(3)	CR&C	Joysticks	Includes:Roll five, Match Wits, and Challenge Poker		24.95
Winter Olympics Pak I	PE040	Cass(3)	CR&C,X-BASIC		Winter Olympic events	11/83	24.95
Golf	PR020	Cass	CR&C,X-BASIC	Joystick	graphics golf		8.50
The Links	PR020	Cass	CR&C		Advanced golf		8.50
A Space Battle	PR020	Cass	CR&C		Graphics space game		6.50
Car Bash	PR020	Cass	CR&C		Car driving graphics		6.50
Lost in the Jungle	PR020	Cass	CR&C		Adventure jungle game		6.50
Destroyer Kill	PR020	Cass	CR&C		Sea battle game, graphics		6.50
Churchill Downs	PR020	Cass	CR&C		Horse race game, graphics		6.50
Fighter Pilot	PR020	Cass	CR&C,Joysticks		Graphics plane-to-plane battle		6.50
Duel on Death Star	PR020	Cass	CR&C		Graphics, total war		6.50
Middleman	PR020	Cass	CR&C		Card game against computer		6.50
Gumshoes Guess	PR020	Cass	CR&C		Detective chase game		6.50
Swami Computer	PR020	Cass	CR&C		Daily predictions		6.50
Vegas Style Roulette	PR020	Cass	CR&C		Roulette game		6.50
Casino Blackjack	PR020	Cass	CR&C,X-BASIC		Graphics card game		8.50
Nevada Draw Poker	PR020	Cass	CR&C,X-BASIC		Graphics card game		8.50
Portal Guardian	PR020	Cass	CR&C,X-BASIC	Joystick	3D Graphics space game		8.50
Desperate Voyage	PR020	Cass	CR&C,X-BASIC, Joystick		Graphics space game		8.50
Police Patrol	RE010	Dsk	DD&C, X-BASIC, 32KMExp		Text adventure		24.95
Police Patrol#2	RE010	Dsk	DD&C, X-BASIC, 32KMExp		Text adventure		24.95
The Legacy	RE010	Dsk	DD&C, X-BASIC 32KMExp		Text adventure	12/83	24.95
Interceptor	RE020	Cass/Dsk	CR&C/DD&C	X-BASIC, Joysticks			19.95
Ring Destroyer	RE020	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks or 32KMExp				19.95
Cape Cod Golf	RI010	Cass	CR&C,Joysticks		9 holes, 1-4 players		15.00
8-Ball	RI010	Cass	CR&C,Joysticks		2 players or teams, regular TI BASIC		15.00
Baseball	RI010	Cass	CR&C,Joysticks		2 players or teams, regular TI BASIC		15.00
Outland	RO010	Cass	CR&C, MiniMem		Asteroid game, 4K Assembly Language		15.95
Megafighter	RO010	Cass	CR&C, MiniMem, Joysticks		Destroy monsters before they destroy you, 4K Assembly Language		24.95
Bomber Attack	RO010	Cass	CR&C, MiniMem	Joysticks	Bombing buildings while under attack, 4K Assembly Language		14.95
Princess and Frog	RO020	CC		Joysticks	Arcade		39.95
Ant Eater	RO020	CC		Joystick	Arcade, create your own maze		39.95
Hen Pecked	RO020	CC		Joystick	Arcade		39.95
Rotor Raiders	RO020	CC		Joystick	Arcade		39.95
Topper	RO020	CC		Joystick	Arcade		39.95
Agent 000	SH010	Cass/Dsk	CR&C/DD&C, X-BASIC	32KMExp	Text adventure game		16.95
Agent 000 Returns	SH010	Cass/Dsk	CR&C/DD&C, X-BASIC	32KMExp	Text adventure game sequel		16.95 both for 24.95
Stair Bear	SH010	Cass/Dsk	CR&C/DD&C, X-BASIC	32KMExp	Graphic arcade game		12.95
Maneuvers	SH010	Cass/Dsk	CR&C/DD&C, X-BASIC	32KMExp	Graphic battle game		12.95
I Ching Caster	SI010	Cass	CR&C, X-BASIC, *I Ching* book		Performs stick casting ritual for fortune telling		9.95
Caterpillar	SO010	Cass	CR&C	X-BASIC	Non-violent action game		10.50
Supertrek	SO020	Cass/Dsk	CR&C/DD&C		Star Trek based game		9.95
Dr. Eliza	SO020	Cass/Dsk	CR&C/DD&C		Conducts a 'therapy' session		15.95
Space Battle	SO020	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Arcade style game		9.95
Big Chick	SO020	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks	Chicken Road Cross arcade style game		9.95
Bombs Away	SO050	Cass	CR&C, Joysticks				15.95
Dragons	SO050	Cass	CR&C				13.95
Starship	SO050	Cass	CR&C, Joysticks				13.95
Battleship Attack	SO050	Cass	CR&C, Joysticks				13.95
Racers	SO050	Cass	CR&C				13.95
Memory Challenge	SO050	Cass	CR&C				13.95
T.I. Toad	SO060	Dsk	DD&C, X-BASIC, 32KMExp	Joysticks	Arcade action written in Assembly Language		29.95
Burger Builder	SO060	Dsk	DD&C, X-BASIC, 32KMExp	Joysticks	Arcade action written in Assembly Language		24.95
Spin-A-Fortune	SU020	Cass	CR&C		TV game show simulation		12.95
Walls and Bridges	T0020	Cass	CR&C, Joysticks		1 or 2 player action game		19.95
Zombie Mambo	T0020	Cass	CR&C, Joysticks		Animated graphics adventure (2 programs)		22.95
Psyborg	T0020	Cass	CR&C, Joysticks		Animated graphics adventure (3 programs)		29.95
Super Bonus Pak	T0020	Cass	CR&C, Joysticks		Walls and Bridges plus Zombie Mambo		29.95
Starfire IV	TE020	Cass	CR&C, X-BASIC		Game		18.00
Las Vegas Keno	TE020	Cass	CR&C		Game		15.00
Las Vegas Keno	TE020	Cass	CR&C, X-BASIC		Game		15.00
Las Vegas Slot Poker	TE020	Cass	CR&C, X-BASIC		Game		15.00
Part 1-House of Evil	TE020	Cass	CR&C, X-BASIC		Text Adventure		12.00
Part 2-Caverns of Evil	TE020	Cass	CR&C, X-BASIC		Text Adventure		12.00
Set-House/Caverns of Evil	TE020	Cass	CR&C, X-BASIC		Text Adventure		20.00
Search and Destroy	TE020	Cass	CR&C, X-BASIC		Game		18.00
Musical Christmas	TE020	Cass	CR&C		Graphics/Sound		15.00
Musical Christmas	TE020	Cass	CR&C, X-BASIC		Graphics/Sound		15.00
Las Vegas Craps	TE020	Cass	CR&C, X-BASIC		Game		15.00

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Texas Software Demo	TE020	Cass	CR&C, X-BASIC		Game demonstration		5.00
Beanstalk Adventure	TE030	Dsk	DD&C, X-BASIC, 32KMExp		Interactive adventure game		17.95
Z-Burt	TE060	Cass/Dsk	CR&C/DD&C, X-BASIC	Joysticks, SpSyn	Jump your Z-Burt around a pyramid		17.95
4-Game Strategy Pack	TE060	Cass	CR&C		Lunar Mission, Blackjack, Checkers, and Space War are included		19.95
Spy Mission	TE060	Cass	CR&C		Spy adventure with limited graphics		12.50
Frazzle	TE060	Cass	CR&C, X-BASIC, Joysticks		Collect treasure but don't get caught		15.95
Garkon's Getaway	TE060	Cass	CR&C, X-BASIC, Joysticks		Help Garkon escape from the evil wizard's dungeon.		15.95
The Game of Wit	TE060	Cass	CR&C, X-BASIC		1st game in the 5-game 'WIT' Series		16.95
Nit-Wit	TE060	Cass	CR&C, X-BASIC, Joysticks		2nd game in the 5-game 'WIT' Series		18.95
Wit or Wit-Out	TE060	Cass	CR&C, X-BASIC		3rd game in the 5-game 'WIT' Series		16.95
Wittle Tags	TE060	Cass	CR&C, X-BASIC		4th Game in the 5-game 'WIT' Series		16.95
Wit's End	TE060	Cass	CR&C, X-BASIC		5th game in the 5-game 'WIT' Series		16.95
Bombardment	TO010	Cass	CR&C, Joystick		Arcade style		11.99
Chase	TO010	Cass	CR&C, Joystick		Arcade style		11.99
Road Race	TO010	Cass	CR&C, Joystick		Arcade style		11.99
Thief	TO010	Cass	CR&C, X-BASIC, Joystick		Graphic adventure		14.99
Monkey Kong	TO010	Cass	CR&C, X-BASIC, Joystick		Arcade style		14.99
The Haunted Lighthouse	TO010	Cass	CR&C, X-BASIC, Joystick		Graphic adventure		17.99
The Castle of Death	TO010	Cass	CR&C, X-BASIC, Joystick		Graphic adventure		17.99
The Quest for Hitler's Diary	TO010	Cass	CR&C, X-BASIC, Joystick		Graphic adventure		17.99
The Chicken	TO010	Cass	CR&C, X-BASIC, Joystick		Arcade Style		14.99
Nemeses	UN020	Cass	CR&C, X-BASIC		Space battle		12.95
Quadrus	UN020	Cass	CR&C, X-BASIC		Space battle		12.95
Saturn VII	UN020	Cass	CR&C, X-BASIC		Lander with obstacles		12.95
Vortex	UN020	Cass	CR&C		Space adventure		12.95
Caverns	UN020	Cass	CR&C		Adventure game		12.95
Game of Duck	UN020	Cass	CR&C, X-BASIC		Game of skill-Pot of Gold and Ladders		14.95
Red Dread	VA020	Cass	CR&C		Arcade game		9.99
Digger Duck	VA020	Cass	CR&C		Strategy game		9.99
Chromium Shuttle	VA020	Cass	CR&C		Space adventure		13.99
Chopper Fireman	VA020	Cass	CR&C, X-BASIC, Joysticks		Arcade game		19.00
Mariner	VA020	Cass	CR&C, X-BASIC, Joysticks		Adventure/arcade game		19.99
Astrid	VA020	Cass	CR&C, X-BASIC, Joysticks		Arcade/artificial intelligence		19.99
Dark Ages	VI010	Cass/Dsk	CR&C/DD&C		Text adventure		14.95
5 of a Kind	W0010	Cass	CR&C		Like famous dice game		10.00
DIYAD	WE010	Cass	CR&C		Two programs allow user to (a) compose and (b) play adventure games		16.50
Toad Graphics	WE010	Cass	CR&C		Inexpensive alternative to turtle graphics		14.50
Tizzy & Hangman	WE010	Cass	CR&C		Word games, including Hangman, based on words containing "TI"		10.50
Timon & Muzak	WE010	Cass	CR&C		Like Simon Game, full octave		8.50
Kwizkid	WE010	Cass	CR&C		History & geography quiz		10.50
Othello	WE010	Cass	CR&C		Strategy boardgame similar to Go		14.50
ZIREXX	WE030	Cass	CR&C, X-BASIC, Joysticks		Space encounter, both joysticks control lasers		10.95
Northseas Battle	WE030	Cass	CR&C, X-BASIC, Joysticks		Submarine against 14 ships		10.95
Galactic Warrior	WE030	Cass	CR&C, X-BASIC, Joysticks		Fast action space, changing screen color		10.95
World Defender	WE030	Cass	CR&C, X-BASIC, Joysticks/Keyboard		Defend the world against invaders		10.95
Destination Earth	WE030	Cass	CR&C, X-BASIC		Flying saucer invasion		10.95
Create Graphics	WE030	Cass	CR&C, X-BASIC		Screen is your drawing board		10.95
Boridium I	WH010	Cass	CR&C, X-BASIC	SpSyn, Joysticks	Error free, graphic tracking game		10.00
Robans	WH010	Cass	CR&C, X-BASIC	SpSyn, Joysticks	Avoid the galactic cop to pick "Magic Mushrooms"		10.00
Bumbles and Blossoms	99010	Cass	CR&C, X-BASIC	Joystick	You assume the role of a worker bee trying to find pollen-laden flowers		9.95
Archeodroid	99010	Cass	CR&C	Joystick	An archeological expedition to a lost civilization thought to be the legendary Earth		9.95
Snakes 'N' Eggs	99010	Cass	CR&C	Joystick	A giant boa winds its way through a pylon maze to eat eggs		9.95
Simon's Saucer	99010	Cass	CR&C		An extraterrestrial emissary challenges you to an audiovisual memory game		9.95
Orbital Defender	99010	Cass	CR&C, X-BASIC	Joystick	Arcade-style space shootout		9.95
Grubstake	99010	Cass	CR&C, X-BASIC		Gold-bugs reap the rewards —and experience all the risks		9.95
Blockade Runner	99010	Cass	CR&C		From your command post on the bridge you must try to stop blockade runners		9.95
Fleet Command	99010	Cass	CR&C		Deploy a naval task force against a similar attack group commanded by the computer		9.95
Torpedo Alley	99010	Cass	CR&C, X-BASIC		As skipper of the attack submarine, you must constantly look for enemy tankers		9.95
Evacu-Pod	99010	Cass	CR&C, X-BASIC		With aid of multi-colored contour map, navigate a safe and fuel-efficient route across hazardous galactic terrain		9.95
Package #M1/6	99010	Cass	CR&C, (2 req. XBASIC)		6 educational and entertainment programs from Vol. 1, No. 6, *99'er HCM*		12.00
Package #M2/1	99010	Cass	CR&C, (2 req. X-BASIC)		5 game and utility programs from Vol. 2, No. 1, *99'er HCM*		12.00
Package #M2/2	99010	Cass	CR&C, (2 req. X-BASIC)		4 game and utility programs from Vol. 2, No. 2, *99'er HCM*		12.00
Package #M2/3	99010	Cass	CR&C, (1 req. X-BASIC)		4 educational, utility, and entertainment programs from Vol. 2, No. 3, *99'er HCM*		12.00
Package #M2/4	99010	Cass	CR&C, (3 req. X-BASIC)		5 game and utility programs from Vol. 2, No. 4, *99'er HCM*		12.00

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
Package #M2/5	99010	Cass	CR&C, (2 req. X-BASIC)		6 game and utility programs from Vol. 2, Nos. 6 and 7, *99'er HCM*		12.00
Music							
Music Interludes	AR010	Cass/Dsk	CR&C/DD&C		Music Composition		7.00
Synthesizer	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC and 32KMExp		Electronic music	11/83	19.95
Early Music Skills (1)	GI010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Introduction to reading and understanding musical staffs—four part tutorial and drill		18.50/22.50
Early Music Skills (2)	GI010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Tutorial and drill on the musical alphabet and reading the grand staff.		18.50/22.50
Key Signatures (1)	GI010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Game format drill in major and minor key signatures. Tutorial on sharps and flats.		18.50/22.50
Key Signatures (2)	GI010	Cass/Disk	CR&C/DD&C, X-BASIC	RS232, Printer	Shows the key signatures. Students name the major and minor key. Place sharps and flats on the staff		18.50/22.50
Musical Keyboard	HA010	Cass/Dsk	CR&C/DD&C		Converts computer to an instrument		30.00/40.00
Music System	HA010	Dsk	DD&C, 32KMExp		Music entry/play		200.00
Composer	IN010	Cass/Dsk	CR&C/DD&C		Compose music		NA
Eartrainer	IN010	Cass/Dsk	CR&C/DD&C		Perfect your pitch recognition		NA
Bach Bonanza	LO010	Cass	CR&C, Music Maker CC		10 Bach Compositions		9.85
Note Whiz	ME010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Music skills—note reading		29.95
Pitch Master I	ME010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Music skills—pitch dictation and identification		39.95
Chord Speller	ME010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Music skills—chords		39.95
Pitch Master C	ME010	Dsk	DD&C, X-BASIC	RS232, Printer	Comprehensive Version (4 programs)		59.95
Harmonia	ME010	Cass/Dsk	CR&C/DD&C, X-BASIC		Music skills—Harmonic listening and identification (&/or chord analysis)		49.95
Rhythm Tutor	ME010	Cass/Dsk	CR&C/DD&C, X-BASIC		Music skills—rhythm	11/83	39.95
Rhythm Match-up	ME010	Cass/Dsk	CR&C/DD&C		Rhythm skills—children	11/83	24.95
Notes and Keys	ME010	Cass/Dsk	CR&C/DD&C		Music skills—piano keys and music staff (children)	11/83	24.95
Music Composer	NO010	Cass	CR&C, X-BASIC		Helps you compose music		18.95
Music Editor	NA010	Dsk	DD&C, 32KMExp		Generates music data		29.95
Music Synthesizer	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp		Duplicate sheet music into your own programs the easy way.		19.95/23.95
Inventio VIII	PR020	Cass	CR&C		Music, computer demo (Bach)		6.50
Notes in a Nutshell	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		5 finger patterns		19.95
Lollipops & Lemons	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		Note names		19.95
Create a Creature	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		Sightreading groups		19.95
Ski with a Count	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		Teaches note value		19.95
Artesian Escape	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		8th or 16th note patterns		19.95
Extra-Terrestrial Rescue	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Order of sharps and flats		19.95
Pizza Go' Round	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysicks		Major keys		19.95
Dine with Dragons	SO090	Cass/Dsk	CR&C/DD&C, X-BASIC		Minor keys		19.95
Music Master	VI010	Dsk	DD&C, X-BASIC		Music,Volume 1	10/31/83	TBA
Word Processing							
Textriter I	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, X-BASIC, RS232, Printer		Full screen typewriter, all TI-99/4A Printer characters		24.95
Textriter II	AR030	Cass/Dsk	CR&C/DD&C, TV Adaptor, X-BASIC, RS232, Printer, 32KMExp		Same as Textriter I, but with storage, sequential print		44.95
Direct Writer II	DY020	Dsk	DD&C, X-BASIC, 32KMExp	RS232, Printer	Word processor		66.00
Pretty Printer	EA010	Dsk	DD&C, X-BASIC, 32KMExp	RS232, Printer	Formats output		17.95
Typwriter	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	MExp not required; cursor control editing		32.00/35.00
Companion	IN040	Dsk	DD&C, X-BASIC, 32KMExp	80-column printer	Assembly language word processor		64.95
Hebrew Typewriter Program	MI040	Cass	CR&C	RS232, Printer	Hebrew text writer		19.95
Easy Write	NO010	Cass	Console B.	MiniMem	Full range word processor		18.95
Tex-Writer	SO020	Dsk	DD&C, X-BASIC, RS232, Printer		Word processor		44.95
TexTwist	T0030	Cass	CR&C, X-BASIC		Store recipes, mailing lists & other texts on file	11/83	9.95
Tex-Scriber	TE040	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Printer, 32KMExp		Menu-driven word processor		19.95
Tex-Memo	TE040	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Printer, 32KMExp		Appointment data base		14.95
Textiger II	TE050	Cass/Disk	CR&C/DD&C, X-BASIC, RS232, Printer		Word processing for minimal 16K system		49.95
Textiger III	TE050	Disk	DD&C, X-BASIC, RS232, Printer, 32KMExp		Word processing for 32K system; double cursor, cut/paste, edit		39.95
Wordware	UN010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer	Text-editing and formating		24.95
Text T.A.L	VA020	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Printer		Letters & short text		15.99

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
W.O.R.D. Writer	W0010	Cass/Dsk	CR&C/DD&C	RS232, Printer, 32KMExp	Word processing		20.00
W.O.R.D. Writer Extended	W0010	Cass/Dsk	CR&C/DD&C, X-BASIC	RS232, Printer, 32KMExp	Word processing		30.00
W.O.R.D. Mailer	W0010	Cass/Dsk	CR&C/DD&C	RS232, Printer, 32KMExp	Mail list & form letter		30.00
Printer Book	WE030	Cass	CC&R, X-BASIC	RS232, Printer	Merges lists & text, prints letters, labels or text, must be used with file book		35.95

Programming Aids

Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
On Gaming	CA020	Cass/Dsk	CR&C/DD&C, X-BASIC, Joysticks		Game writing book, sprite editor		19.95
MMM Edit/ Assembler	CA020	Cass/Dsk	CR&C/DD&C, MiniMem		Editor/Assembler, decoder for Mini Memory		24.95
E-Z-Do-XBase	CO010	Cass	CR&C, X-BASIC	Joysticks	Prompted programming of X-BASIC		19.95
Poor Man's Plotter	CO010	Cass	CR&C, X-BASIC		Plotting predefined patterns		14.95
Disassembler	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC and 32KMExp		9900 Code (fast)		19.95
Utility Routines	CU010	Cass/Dsk	CR&C/DD&C, EdAss		30 utility routines		19.95
Floating Point	CU010	Cass/Dsk	CR&C/DD&C, EdAss		Fast math routines		40.00
Character Builder	D0010	Cass	CR&C		Character design		5.95
Dow Editor/ Assembler	DO030	Cass/Dsk	CR&C/DD&C, MiniMem	32KMExp, RS232, Printer	Assembler		25.00
Video Plotter	EA010	Dsk	DD&C, X-BASIC, 32KMExp		Screen Plot of data		19.95
Disk Manager	EA010	Dsk	DD&C, X-BASIC, 32KMExp		Sorts, lists disk file names		17.95
Multiple Statement Program Generator	EA010	Dsk	DD&C, X-BASIC, RS232, Printer, 32KMExp		Converts to multiple statement listings		18.95
Disassembler	EA010	Dsk	DD&C, Assembly Language, RS232, Printer, 32KMExp		Disassembles Assembly Language		18.95
Easyscreen	EA020	Cass	CR&C		Define graphics characters and colors on the screen		15.00
Easysong	EA020	Cass	CR&C		Turn the keyboard into a 4-octave piano, screen editor		15.00
File Delete Utility Program	HA010	Listing	DD&C		Disk maintenance		5.00
Sort Utility	HA010	Listing	DD&C		For relative files		10.00
Video Titles I	J0020	Cass/Dsk	CR&C/DD&C	Monitor Cable	Produces custom titles for video recordings		29.95
Video Titles II	J0020	Dsk	DD&C, X-BASIC	RS232, Printer, Monitor Cable	Produces automated title sequences w/ optional animation for in-store advertising or video recordings		49.95
Master Titler	J0020	Dsk	DD&C, X-BASIC	RS232, Printer, Monitor Cable	Produces custom titles		79.95
Super Cataloger	J0020	Dsk	DD&C, X-BASIC, 32KMExp	RS232, Printer	Sorts up to 550 file names, identifying disk, size & type		29.95
Video Titles III	J0020	Cass/Dsk	CR&C/DD&C	RS232, Printer	Produces hexadecimal values for CALL CHAR instructions to create custom titles		24.95
Super Extended Basic	J0020	Dsk	DD&C, X-BASIC, 32KMExp		Fast Assembly Language subroutines, includes SORT & MERGE with multiple ascending/descending keys	11/83	99.95
Programmers Pac	MA010	Cass	CR&C		Software numeric keypad input subroutine, miscellaneous other programming aids.	12/83	8.95
Disk Fixer	NA010	Dsk	DD&C, 32KMExp	RS232, Printer	Sector by sector access		29.95
Sprite Editor	NA010	Dsk	DD&C, 32KMExp	RS232, Printer	Generates sprites		29.95
Graphics Package	NO010	Cass/Dsk	CR&C/DD&C, X-BASIC, 32KMExp	RS232, Printer	High-resolution graphics		19.95/23.95
SMASH	OA010	Dsk	DD&C, X-BASIC	RS232, Printer	Program optimizer		24.95
Display Enhancement Package	OA010	Cass/Dsk	CR&C/DD&C & (32KMExp + X-BASIC/ EdAss/MiniMem)		40 column display package		29.95
Color Monitor Alignment	PR020	Cass	CR&C		Aids in TV or monitor alignment		6.50
Utilities I: Disassembler, Point Plotting Routines, Screen Dump, Speech Utility	RE020	Cass/Dsk	CR&C/DD&C, X-BASIC, MiniMem or EdAss for BASIC or SpSyn	X-BASIC, Assembly Language			19.95 for all 4
Graphics Designer	SC010	Cass/Dsk	CR&C/DD&C, X-BASIC		Designing characters. sprites, re-designing ROM-based characters		12.95/14.95
Mini-ED/ASM	SI010	Cass	CR&C, MiniMem		9900 Editor and Assembler in BASIC		16.45
Tutor	SO010	Manual	MiniMem		Tutor Assembly Language		14.50
Tutor II	SO010	Manual	MiniMem	EdAss	Continuation of Assembly Language Tutor I		14.50
Graphics Code Generator	SO030	Cass/Dsk	CR&C/DD&C, X-BASIC, Joystick	RS232, Printer	Calculates and displays hexcodes for graphics		16.95/19.95
THinc Sprites	T0010	Dsk	DD&C, X-BASIC, 32KMExp	Joysticks	Automatic sprite generator and graphics editor		19.95
The "Plotter"	UN010	Dsk	DD&C, X-BASIC, 32KMExp	RS232, Printer, Joystick	Plotting subprograms for Extended BASIC		29.95
Disk Utility2.0,4.0	VI010	Dsk	DD&C, 32KMExp	X-BASIC	Auto Loader, Catalog		24.95
Speak & File	VI010	Cass/Dsk	CR&C/DD&C, TE II, SpSyn		Speech with files		14.95
Wycove Forth	WY010	Cass/Dsk	CR&C/DD&C, 32KMExp, EdAss		Programming language for high speed control of the 99/4A	NA	40.00
Wycove Forth	WY010	Cass/Dsk	CR&C/DD&C, 32KMExp, MiniMem		Programming language	NA	40.00
Wycove Forth	WY010	Cass/Dsk	CR&C/DD&C, 32KMExp, X-Basic		Programming language	NA	40.00

Other

Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
First Ade, Version 1.1	A0010	Dsk	DD&C, X-BASIC, 32KMExp, First Ade Control System		Enables First Ade owners to program logic conditions and set points to control outputs and displays data		Supplied with First Ade Control Card
Diet-Rite	AR010	Cass/Dsk	CR&C/DD&C		Diet evaluator		7.00

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Program Title	Mfr. No.	Medium	Req'd Accs.	Opt. Accs.	Description	Available	Sugg. Retail
NFL Predictor	AR010	Cass/Dsk	CR&C/DD&C		Football prediction		7.00
Easydata	AY010	Dsk	DD&C, X-BASIC	RS232, Printer	Data storage, update and retrieval		29.95
Coin Collector	CA030	Cass	CR&C		Coin collection filer		14.95
Stamp Collector	CA030	Cass	CR&C		Stamp collection filer		14.95
Joggers Track	CA030	Cass	CR&C		Track your distances		14.95
Bikers Travels	CA030	Cass	CR&C		Bicyclist records		14.95
Sports Watcher	CA030	Cass	CR&C		Records your team's games		12.95
Color Bar-Dot Generator	CO010	Cass	CR&C, 16K Console	X-BASIC	TV service aid, will run in BASIC or X-BASIC		12.95
Morse Code (Ham)	CU010	Cass/Dsk	CR&C/DD&C		Teach yourself		12.50
Code Practice (Ham)	CU010	Cass/Dsk	CR&C/DD&C, MiniMem or X-BASIC & 32KMExp		Advanced (up to 35 WPM)		12.50
Beam Calculator (Ham)	CU010	Cass/Dsk	CR&C/DD&C		For antenna direction		12.50
Log Program (Ham)	CU010	Cass/Dsk	CR&C/DD&C		For antenna direction		7.50
Usable Frequency (Ham)	CU010	Cass/Dsk	CR&C/DD&C		Calculator for SW		12.50
Dow Jones Connector	DO040		Modem	Printer, Monitor	Access to all 21 data bases in the Dow Jones news, quotes, business and investments services.		49.95
Screen/Dump	EX010	Cass/Dsk	CR&C/DD&C, X-BASIC, RS232, Printer		Reproduces screen graphics pixel by pixel		12.00
Home Brewed Antennas	FO030	Cass	CR&C		Program on antennas		14.95
Ham or Shortwave Log File	LO010	Cass	CR&C		Store all Ham radio information to keep shack in order	10/83	8.50
Cassette Catalogue	MA010	Cass	CR&C	X-BASIC	Program library index, aids locating and loading programs		10.95
DSK-IT	MA030	Cass	CR&C/DD&C, MiniMem or X-BASIC & 32KMExp		Loads X-BASIC and ASM programs to diskette (from tape)		19.95
GraphicArt	MI090	Cass	CR&C		Entertaining designs		free w/Psi Lab
MINI LOGO	N0010	Cass	CR&C, X-Basic		Children's language		16.95
Astrology	NA010	Dsk	DD&C, 32KMExp, Printer		Prints horoscope chart		19.95
Handicapper	PE020	Cass	CR&C		Horse race handicapping		25.00
Magic Square	PR020	Cass	CR&C		Contest with prizes of programs		6.50
Sketch Pad	PR030	Cass	CR&C		Color graphics program, 30 ready access characters, draw/color and save drawings		19.95
Aeronaut	SI010	Cass	CR&C, X-BASIC		Hot air balloon flight simulation		19.95
Score Board	SI010	Cass	CR&C, X-BASIC	Joysticks	Table tennis scoring		12.95
Morty	SI010	Cass	CR&C, MiniMem		Decodes and displays Morse Code input to cassette port		16.45
Coilcalc	SI010	Cass	CR&C, X-BASIC		Coil calculations for engineers, radio amateurs		12.95
Compatibility	SU010	Cass	CR&C		Analyses 44 (approx.) questions and prints comments and a "compatibility rating"		11.00
The Genealogy Workshop	TE010	Dsk	DD&C, 32KMExp, 80-column printer		Genealogical record keeping		49.95
Tex-Net	TE040	Cass/Dsk	CR&C/DD&C, RS232, Printer		Networking System for classroom—requires special cables		79.95
Prophet	TR010	Cass	CR&C	RS232, Printer	Horse race handicapping aid		34.95
Model Rocketry	VA020	Cass	CR&C		Computes rocket performance		25.99
X-BASIC Directory	VI010	Cass/Dsk	CR&C/DD&C, X-BASIC		Phone dialer & directory		14.95

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Monitors

Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
2-in-1 TV Rec/Mon	VI020	Arcade quality display, dual purpose color Receiver/Monitor	TI-99/4A (Custom Modified)	Screen can be used as either a standard TV receiver or a medium resolution, high quality color monitor		13"-589.00 19"-673.00

Printers

Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
Gorilla Banana GX-100-P, GX-100-R	LE010	50 cps, 80 cpl, tractor feed	Parallel or Serial	5x7 Dot-Matrix printer, unidirectional, dot addressable graphics		249.95
Prowriter 8510 A-P, 8510BCD	LE010	120 cps, 80 cpl, friction and tractor feed	Parallel or Serial	7x9 Dot-Matrix printer, bidirectional, hi-resolution graphics		Parallel 495.00 Serial 745.00
Prowriter II 1550-R 1550CD	LE010	120 cps, 136 cpl, friction and tractor feed	Parallel or Serial	7x9 Dot-Matrix printer, bidirectional, hi-resolution graphics		Parallel 995.00 Serial 995.00
8600-BP, 8600BC	LE010	180 cps, 80 cpl, friction feed (tractor option)	Parallel or Serial	18-wire Dot-Matrix printer, bidirectional, hi-resolution graphics, multi-mode		Parallel 1295.00 Serial 1395.00
Starwriter F-10-40	LE010	40 cps, 136 or 163 cpl, friction or tractor feed	Parallel, Serial or IEEE	Daisywheel printer, bidirectional		1895.00
Printmaster F-10-55	LE010	55 cps, 136 or 163 cpl, friction or tractor feed	Parallel, Serial, or IEEE	Daisywheel printer, bidirectional		1995.00
CX-4800-P, CX-4800-R	LE010	8 cps print speed, 4.2" per second plotting speed, up to 255 different character sizes, friction or pin feed	Parallel or Serial	4-color printer/plotter, bidirectional, vector graphics		695.00
Print Mate 99	M0010	80 columns, 100 cps, standard serial or parallel, standard 1K buffer, standard tractor or friction feed		Expandable to 2K, dual parallel or serial interface, 2K expandable to 64K buffer		standard 599.00, options additional
Print Mate 150	M0010	136 columns, 150 cps, standard parallel, optional serial, standard tractor feed		Bidirectional 7x9 dot matrix data printing, 8 different models		995.00 to 1,345.00
Microline 82A	OK010	Dot-Matrix Printer		120 CPS, 80-column		549.00
Microline 83A	OK010	Dot-Matrix Printer		120 CPS, 133-column		899.00
Microline 92	OK010	Dot-Matrix Printer		160 CPS, 80-column		698.00
Microline 93	OK010	Dot-Matrix Printer		160 CPS, 133-column		1249.00
TP-I	SM010	Daisy Wheel	RS232 Serial or Centronicis parallel	Printer		695.00
TP-II	SM010	Daisy Wheel	Dual Interface	Character set 128 ASCII, 93 printable		749.00
Tractor Feed	SM010	Fits TP-I and TP-II		Optional tractor feed		149.00
Printer	SO070		PEB	120 CPS Dot-Matrix		359.95
Gemini 10X	ST020	Centronics parallel printer, optional RS232 serial 59.00, serial interface 4K buffer 119.00	PEB, cable, RS232 and serial cable	120 cpl, 816 byte buffer, 80 characters, 96 user programmable characters, standard and italic print, printer buffer expandable 8K		399.00
Gemini 15	ST020	Centronics parallel printer, optional RS232 serial 79.00, 2K smart buffer 129.00	PEB, cable, RS232 and serial cable	2.3K printer buffer expandable to 4K, standard, italic, and proportional type		599.00
STX-80	ST020	Thermal printer, Centronics parallel	PEB, optional serial to parallel converter 79.00	60 cps, 1 line print buffer, print size 11 and 5.5 cpi, column scan, bit image graphics	9/15/83	199.00

Storage Devices (cassette recorders, disk drives, etc.)

Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
Memory 32K	DO020	32K Memory		32K Memory plugs in directly to the 99/4A		175.00
32K Card	FO020	32K Memory	PEB	Expansion memory compatible with TI-99/4A		150.00
128K Card	FO020	128K Memory	PEB	Expansion memory compatible with TI-99/4A		220.00
Model 2000	IN030	32K Memory		32K Memory Add-on		220.00
Model 1000	IN030	32K Memory		32K Memory Card		130.00
Model 2100	IN030	RS232, 32K Memory		RS3232,32K Add-on		280.00
WDS/100 Winchester Disk Controller System	MY010	5,10,15 Megabyte Model	DD&C, X-BASIC, PEB, 32KMExp	Clock option available (50.00), fully compatible with TI-99/4 and 4A, comes with entire disk management system		5 MB 2599.00 10 MB 2999.00 15 MB 3399.00
TX-99	PE030	5 1/4" floppy disk drive		Operates without PEB or external controller card. Plug compatible, single-sided single-density system, 92K bits formated storage		449.00
Disk Drive	SO070	Fully compatible	PEB	40 TK Single/Dual Head		175.00 and up
Disk Drive	SO070	Fully compatible	PEB or Controller	40 TK Single/Dual Head		199.95 and up
32K Memory	TA010	Compatible with TI peripherals		Stand alone 32K Memory Module		110.00
Ultra-RAM,DM-16	UL010	16Kx8 words	TI-99/4A	Stand alone MExp Module		99.95
Ultra-RAM,DM-32	UL010	32Kx8 words	TI-99/4A	Stand alone MExp Module		149.95
Ultra-Smart-RAM, CM-8	UL010	8Kx8 words CMOS	TI-99/4A	Stand alone CMOS MExp (Non-volitile storage)		119.95
Ultra-Smart-RAM, CM-16	UL010	16Kx8 words CMOS	TI-99/4A	Stand alone CMOS MExp (Non-volatile storage)		169.95
Ultra-Smart-RAM, CM-32	UL010	32Kx8 words CMOS	TI-99/4A	Stand alone CMOS MExp (Non-volatile storage)		269.95
DMPEX-32	UL010	32Kx8 words	PEB	Ultra-RAM MExp Module	10/83	159.95
DMPEX-16	UL010	16Kx8 words	PEB	Ultra-RAM MExp Module	10/83	109.95
CMPEX-8	UL010	8Kx8 words	PEB	Ultra-Smart RAM CMOS MExp	10/83	129.95
CMPEX-16	UL010	8Kx8 words	PEB	Ultra-Smart RAM CMOS MExp	10/83	179.95
CMPEX-32	UL010	32Kx8 words	PEB	Ultra-Smart RAM CMOS MExp	10/83	279.95
CEX-1	UL010	Uses Mini-Mod Programmable Cartridge	TI-99/4A	Single Cartridge Expansion Module	11/83	NA

Interfaces

Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
First Ade Control Card	A0010	8-bit data acquisition and control	DD&C, X-BASIC, PEB, 32KMExp	8 analog inputs, 8 digital inputs, 8 digital outputs		249.95
First Ade Interface	A0010	120V AC control	Used with First Ade Control Card	Terminations for digital and analog inputs, 8-relay switched AC receptacles		99.95
Temperature Probes	A0010		Used with First Ade system	3 temperature ranges, 0-5V DC output analog signal		24.95
RS232 Interface	A0020	Bidirectional, Serial	Console	Stand alone interface for modems, printers and terminals		169.95
Signalman MK III Modem	AN010	300 baud direct connect	RS232 Port	Battery operated, computer cable included		139.00
Paraprint 18A	DO020	Serial Interface		Connects directly to the TI and eliminates the PEB		105.00
Widget	NA010		Console only	Cartridge expander board		49.40
Epromer	NA010	Plugs into Widget	32KMExp, DD&C, EdAss	Eprom burner		300.00
Cart/Progm	NA010	Cartridge Programmer	32KMExp, DD&C, EdAss	Program ECPC Eprom cartridge		300.00

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Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
Wire Wrap Prototype Board SAT 4512	SP010	Holds 48 wire wrap sockets	PEB	Builds custom interfaces circuits		48.50
Prototype Kit SAT 4513	SP010	Wire wrap socket and pins	SAT 4512	Assortment of wire wrap sockets for use with SAT 4512		39.95
Bus Extender SAT 4511	SP010	Raises expansion module 6" up in PEB	PEB	Provides access to expansion modules for repair and debugging		48.50
Double Density Disk Controller Up Grade Kit	SP020		PHP 1800 Disk Controller	Increases PHP 1800 to double-sided DD		269.95
TI CEN Cable 7040	TE010			Standard parallel interface cable for Epson, Star, TI and other printers		24.95
TI CEN Cable 7050	TE010			Parallel interface cable for Okidata printers		37.95
TI CEN Cable 7051	TE010			Parallel interface cable for Smith-Corona TP-1		37.95
TI CEN Cable 7055	TE010			Parallel interface cable for Amdek DXY Plotter		37.95
Mark III	TE030	Modem	RS232 Card	Direct Connect Modem, free Source membership included		134.95
Half Size Disk Installation Kit	WE020		PEB	Provides cabling req. to mount 2 half-sized disk drives in TI Perpipheral Expansion Box		25.00 if purchased with DD, 39.00 if not
Power Module	WE020		PEB	Powers 2nd line when you put 2 slim lines in peripheral box		20.00 if purchased with DD, 35.00 if not
Printer Cable	WE020	Interface for Printer		To adapt 99/4A to Centronics parallel		24.95
Tex-Sette Adapter	99010			Allows the TI Home Computer to control the automatic start-stop feature of your cassette recorder		5.95

Joysticks, Keypads, and Controllers

Joystick Stabilizer	JA010		Joystick	100 to 500% increased game scores, eliminates hand fatigue		7.95
MBX Expansion System	MI070				11/83	129.95
Additional Joystick	MI070				11/83	29.95
Texas Light Shooter	NO020	Photoreceptor gun		Photoreceptor gun plugs into joystick port, allows you to shoot targets on the screen		30.00
Super Joystick II	TE030	Arcade quality		4-way, 8-way joystick designed for TI arcade type games		29.95

Storage Media (diskettes, cassettes, etc.)

Computer Cassette PCC 510	PA020	C-10 Length	CR&C	Premium blank cassette		0.58 without Norelco Box, 0.70 with Box
Diskette	SO070	SS/DD	Soft sector	Dual density blank		20.00 pack
Datex	TE030	TI-99/4A compatible		Precision disks and cassettes for data storage		Assorted prices
Tex-Comp	TE030	TI-99/4A compatible		Precision disk and cassettes for data storage		Assorted prices
Dracula	TE030	TI-99/4A compatible		Precision disk and cassettes for data storage		Assorted prices
Tex-Soft	TE030	TI-99/4A compatible		Precision disk and cassettes for data storage		Assorted prices
10-X	TE030	Flip-Flop		Floppy disks		Assorted prices
99'er Ware C-10 Digital Computer Cassettes	99010	Special BASF tape with 5-screw housing for data integrity		6 blank cassettes		7.00

Accessories (furniture, dust covers, storage containers, etc.)

Command Cartridge Storage Device	DI010	Solid oak construction		Storage for 10 Command Cartridges		12.95
C-121Q	DY010	Power protection	120 VAC	3-outlet surge suppressor		49.95
DATAble	GR030	Desktop computer stand	Keyboard and monitor	Black or light tan, 22"x 12"x 5"	10/83	25.95
PRINTable	GR030	Desktop printer stand	Printer	Black or light tan.22"x 12"x 8"	10/83	29.95
The Platform	MI060	Wooden stand		Stand for placing monitor where cords can run under		19.95
Computer Console	PR030	Sliced red oak end and divider panels, laminate surface		Custom-tailored furniture designed especially for TI-99/4A		299.00
Matching Peripheral/ Printer Unit	PR030	Sliced red oak		Matching peripheral printer unit to sit beside computer console or to use alone		179.00
Storage/File Unit	PR030	Plastic laminate		Storage/file unit bolts to computer console as a 2-drawer unit		99.00
Cable	SO070			2-drive cable		25.00
Home Computer Center	ST010	Oak and/or walnut veneer		36" x 20" x 34", flip-up fully receded door and a full extending slide out shelf		380.00/395.00
Personal Computer Desk	ST010	High pressure laminate		26" x 24" x 48" drawer unit, left or right mounting 12" x 16" x 14"		Desk w/o drawer unit 200.00, with drawer unit 320.00
Computer Work Station	ST010	Oak or walnut veneers & high pressure laminate		26"x24"x42" wide desk, 23"x24"x29" printer table, 9"x12"x22" monitor stand		Desk 190.00-250.00, printer table, 195.00-255.00, monitor stand, 50.00
Executive Work Center	ST010	Oak or walnut veneer & high pressure laminate		29"x30"x60" desk, 26"x24"x48" side desk, corner unit attaches desks together		Desk 560.00-675.00, side desk 40.00-350.00, corner unit 115.00 and up
Dust Cover	TE010	8-gauge, anti-static		Dust cover for TI-99/4A		4.95
Printer Cover	TE010	8-gauge, anti-static		Dust cover for TI, MX-80, FX-80 printers		8.95
Cassette Cover	TE010	8-gauge, anti-static		Dust cover for cassette recorder		4.95
PEB Cover	TE010	8-gauge, anti-static		Dust cover for Peripheral Expansion Box		11.95
Tex-guard	TE030	Spike Protector		Surge and spike protector with 6 electrical outlets		39.95
Deerfield	TE030	Heavy Duty		Computer Table		149.95
Computer Cover	TE060	Black vinyl cover				7.50

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Item	Mfr. No.	Features	System Reqmts.	Description	Available	Sugg. Retail
10" Monitor Cover	TE060	Black vinyl cover				8.95
PEB Cover	TE060	Black vinyl cover				10.95
TI Printer Cover	TE060	Black vinyl cover				7.50
Okidata Printer Cover	TE060	Black vinyl cover				7.50
Disk Memory drive Cover	TE060	Black vinyl cover				5.95
Speech Synthesizer Cover	TE060	Black vinyl cover				3.95
Cassette Recorder Cover	TE060	Black vinyl cover				4.75
Desk, unfinished	TE060	32W x 24D		Solid pine work center		149.95
Desk, finished	TE060	32W x 24D		Solid pine work center		209.95
Desk, unfinished	TE060	40W x 24D		Solid pine work center		159.95
Desk, finished	TE060	40W x 24D		Solid pine work center		219.95
Desk, unfinished	TE060	46W x 24D		Solid pine work center		169.95
Desk, finished	TE060	46W x 24D		Solid pine work center		229.95
10" Monitor Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		10.95
13" Monitor Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		12.95
PEB Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		12.95
TI-99/4 Printer Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		9.95
Cassette Recorder Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		4.95
Console Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		8.95
Speech Synthesizer Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		3.95
Peripheral Box Covers	99010	Clear vinyl covers		Antistatic, custom-fit equipment protection (for 32KMExp, RS232, or Disk Controller)		5.95
Thermal Printer Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		8.95
Disk Memory Drive Cover	99010	Clear vinyl cover		Antistatic, custom-fit equipment protection		5.95
99'er Finder Binder	99010	Holds six magazines and 12 tapes		Accessory for keeping copies of 99'er *Home Computer Magazine* and tapes together		11.95
Other						
Interconnecting Cable	DO020			Provides chain capability, able to connect PARAPRINT 18A to parallel printer		33.00
Music Software Directory/Update	GI010			Listing of third-party music software, includes two free updates		15.00
Guide to File Processing	HA010	46-page manual	CR&C			25.00
Random File Processing	HA010	65-page manual	DD&C			50.00
Programming Music	HA010	12-page manual	CR&C/DD&C			10.00
The Smart Programming Guide for Sprites	MI060	Book	X-BASIC	Book with short programs and complete documentation on how the programs and routines work.		5.95
99/4A T-Shirts	NQ020			TI-99/4(A), yellow on dark blue; I'm a 99/4A Program Person features ball-headed man logo and computer. Black on red.		10.00
Prototyping Breadboard	PR040	PCB with space for on-board regulators, digitals & analogics, output connectors, bus expander socket	PEB	PCB for development work, takes wire-wrap sockets of various sizes has areas for solder-in discrete components		19.95
Expander Board Kit	PR040	PCB with space for bus expansion socket plus card-edge socket	PEB	PCB for raising bus up to top of expansion box so plug-in boards can be easily worked on	9/10/83	13.95
The Cooler	RE010	Cools console	99/4A	Cooling fan	12/30/83	49.95
Single Stepper, RAM Option	SP020		EdAss	Adds single step and load interrupt to 99/4A		47.95, RAM Option 57.95
Prototype Board	SP020	Holds 60 16-pin IC's	PEB	For breadboard custom projects		42.95
Extender Board	SP020		PEB	For trouble shooting		32.95
Screen Design Pad	TE010	Pad of 40 sheets		Aid for designing TI-99/4A screen graphics		1.95
Character/Sprite Design Pad	TE010	Pad of 40 sheets		Aid for designing TI-99/4A character and sprite graphics		1.95
The Best of 99'er	99010	Book		400 pages full of tutorials, how-to's, and 75 type-and-run programs		19.95
Computer Assisted Instruction with the TI Home Computer	99010	Book		For all those interested in the educational use of the TI Home Computer		5.95
Family Fun with the TI Home Computer, Volume 1	99010	Book		Introduces families to the entertainment possibilities of their TI Home Computers		5.95
More Family Fun with the TI Home Computer, Volume II	99010	Book		Companion to Volume I, takes up where the first book leaves off		5.95
3 Hours to Programming Success with the TI Home Computer	99010	Book		Quickly shows new TI owners of all ages how to write their own programs		5.95

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Alphabetical List of Manufacturers

Company	Mfr. No.
A/D Electronics, P.O. Box 26357, Sacramento, CA 95826, (916) 363-8331	A0010
A. J. International, 4023 Sommers, Drexel Hill, PA 19026, (215) 623-8083	A0020
Alpha2 Computer Services, 4859 South Spencer St., Seattle, WA 98118, (206) 722-7979	AL010
American Software Design and Distribution Co.,P.O.Box 246, Cottage Grove, MN 55016,(612) 459-0557	AM010
Anchor Automation, 6913 Valjean Ave., Van Nuys, CA 91406, (213) 997-6493	AN010
Arcade Action Software, 2007 North 71st St, Wauwatosa, WI 53213,(414) 453-0499	AR010
Arcade Design, P.O. Box 8233, Red Bank, NJ 07701, (201) 787-6693	AR020
Arro-Soft Systems, P.O. Box 1761, Edmond, OK 73083, (405) 341-8567	AR030
Ayers Computer Products, 1619 Geyser Circle, Antioch, CA 94509, (415) 757-1124	AY010
B&B Graphics, 92 Noel Drive, Williamsville, NY 14221, (716) 634-9158	B0010
Robert J. Bandin, 5891 SW 84 St, Miami, FL 33143, (305) 448-8698	BA010
BeeJay FUNWARE, P.O. Box 27643, Denver, CO 80227, (303) 231-1625-Days, (303) 979-6193-Eves	BE010
Ben Hur Software, 1114 West Main St., Crawfordsville, IN 47933, (317) 362-4819	BE020
Bizware Inc., 5014 Hwy. 29, Lilburn, GA 30247, 1-800-221-7171	BI010
Carlin Institute of Weight Control and Health, Inc., Professional Towers, Suite 581, Louisville, KY 40207, (502) 896-2938	CA010
C.A. Root, Associates, 33125 15th Ave. S., Suite B109, Federal Way, WA 98003, (206) 564-1183, (206) 941-8011	CA020
Casas Adobes Software, P.O. Box 36295, Tucson, AZ 85740, (602) 742-1625	CA030
Challenger Software International, P.O. Box 50150, St. Louis, MO 63105, (314) 821-5666	CH010
Computertronics, P.O. Box 15823, Plantation, FL 33318, Walter J. Ballus, (305) 741-7081	CO010
Creative Expressions, Inc., 6433 Winifred, Ft. Worth, TX 76133, (817) 292-8926	CR010
Cumberland Technology, 10 Wagner Drive, Carlisle, PA 17013, (717) 245-2266	CU010
DEJ Software, 575 Wisteria St., Chula Vista, CA 92011, (619) 421-1630	D0010
Data Art Software, 1874 Union Rd., W. Seneca, NY 14224, (716) 674-3408	DA010
Data/Ware Development, Inc., 4204 Sorrento Valley Blvd., San Diego, CA 92121, 1-(800)-382-3282; (619)-453-7660	DA020
Decision-Making Systems, Ltd., P.O. Box 7081, Wilmington, DE 19803, (302) 478-7782	DE010
Detron of Hawaii, 2007 Naio St., Honolulu, HI 96817, (808) 847-7637	DE020
DeVere Company, P.O. Box 672, Forked River, NJ 08731, (609) 693-7131	DE030
Divergent Marketing, Suite 126, 1106 Second St., Encinitas, CA 92024, (619) 753-0850	DI010
Walter J. Dollard, 417 Woodland Hills, Pittsburgh, PA 15235, (412) 823-4438	DO010
Doryt Systems, Inc., 14 Glen St., Glen Cove, NY 11542, (516) 676-7950	DO020
John T. Dow, 6360 Caton, Pittsburgh, PA 15217, (412) 521-9385	DO030
Dow Jones & Co., Inc., P. O. Box 300, Princeton, NJ 08540, (609)452-2000	DO040
Dr. Mom's Kidware, 5357 Carrollton Ave., Indianapolis, IN 46220, (317) 257-3167	DR010
Dymarc Ind. Inc., 21 Governor's Court, Baltimore, MD 21207, (301)298-9626	DY010
Dynamic Data & Devices, P.O. Box 912, Stafford, TX 77477, (713) 343-0033	DY020
Eastbench Software Products, 1290 Cliffside Dr., Logan, UT 84321, (801) 753-1084	EA010
EASYWARE, 27087 Brettonwoods, Madison Hts., MI 48071, (313) 541-2031	EA020
Extended Software Company, 11987 Cedarcreek Dr., Cincinnati, OH 45240, (513) 825-6645	EX010
Fantasia '99 Software, 3 Victor Blvd., St. Catherines, Ontario, Can L2T 2B2	FA010
Fosco Systems Inc., Box 4121, Boca Raton, FL 33429, (305) 392-2816	FO010
Foundation, 74 Claire Way, Tiburon, CA 94920	FO020
Fox Valley Software, P. O. Box 52, South Elgin, IL 60177, (312) 888-0412	FO030
W. W. Frank, P.O. Box 9114, Brea, CA 92621, (714) 529-4189	FR010
Funware, Inc. (A subsidiary of Creative Software), 230 East Caribbean Dr., Sunnyvale, CA 94089, (408) 745-1655	FU010
GATOR Software, 17718 Orchard Lane, Salinas, CA 93907, (408) 663-5040	GA010
Gembar Graphics, 455 Amherst Circle East, Satellite Beach, FL 32937, (305) 676-4690	GE010
Gem Software, 8336 Cheviot Rd., Cincinnati, OH 45247, (513) 741-8250	GE020
Lolita Walker Gilkes, Music Software Consultant, 2701-C West 15th Street, Suite 277, Plano, TX 75075, (214) 596-1943	GI010
Gold Coast Avionics, 908 Alamanda Drive, North Palm Beach, FL 33408, (305) 662-7262	GO020
Graphic Software, P.O. Box 2684, Station 'F', Scarborough, Ontario, Canada M1W 3P3, (416) 826-6011	GR010
Greene-Bytes, P.O. Box 329, Waynesburg, PA 15370, (412) 852-2198	GR020
Greuter Industries, 620 North 48th, Suite 306A, Lincoln, Nebraska 68504, (402) 466-5381	GR030
Colin Gyles, 40 Pine Plain Rd., Boxford, MA 01921, (617) 352-8103	GY030
James Harvey, 159 Dover Rd., Spartanburg, SC 29301, (803) 576-7245	HA010
Homecare Software, P.O. Box 850, Hopkins, MN 55343, (218) 546-6504	HO010
I&I Computer Programming, Ltd., P. O. Box 447, Holden, Alberta, Canada T0B 2C0, (403) 688-3547	I0010
Instrumental Software Systems, Inc., 311 Maple Street, Danvers, MA 01923, (617) 774-3723	IN010
Intellestar, 25 West Middle Lane, Rockville, MD 20850, (301) 951-9633	IN020
Intellitec Computer Systems, 2337 Bonanza Court, South Jordan, UT 84065, (801) 254-2333	IN030
Intelpro, 5825 Baillargeon St., Brossard, Quebec, Canada J4Z 1T1, (514) 656-8798	IN040
Inter-8, 502-285 Loretta Avenue South, Ottawa, Ontario, Canada K1S 5A5, (613) 729-9527	IN050
JCL Sofware, 4010-I HWY 6S, Suite 195, Houston, TX 77082, (713) 933-5534	J0010
J & K H Software, 2820 S. Abingdon St., Arlington, VA 22206, (703) 820-4131	J0020
J.K.S. Software, P.O. Box 105, Wallingford, PA 19086, (215) 872-3525	J0030
JTJ Enterprises, Box 93, Route 1, Adams, TN 37040, (615) 358-2635	J0040
Jackson Design, 12520 Ridgeton Dr., Lakeside CA 92040, (619)443-0417	JA010
Jerseyware Microcomputer Software, P.O. Box 482, Fords, NJ 08863, (201) 225-4128	JE010
Kaleidoscope Programs, P. O. Box 8453, Universal City, CA 91608, (213) 851-4833	KA010
KIDware, P. O. Box 1664, Idaho Falls, ID 83401, (208) 529-9916	KI010
KUHL Software, 412 15th Ave. SW, Rochester, MN 55902, (507) 282-1574	KU010
LPA Associates, P.O. Box 578, Berkeley, CA 94701, (415) 444-3665	L0010
Laramie River Software, P. O. Box 326, Laramie, WY 82070, (307) 721-4149	LA010
Leading Edge Products, 55 Providence Hwy., Norwood, MA 02062, 1-800-343-8413	LE010
Mark London/Programming Dept, 566 Fern Canyon Dr., Palm Springs, CA 92262, (619) 325-7513	LO010
MPI-Micro Peripherals, Inc., 4426 South Century Blvd., Salt Lake City, UT 84107, 1-800-821-8848	M0010
Machine Shoppe Software, 405 Chestnut Drive, Ozark, AL 36360, (205) 774-9162	MA010
Magic Software, Inc., 3148 S. 14th St., Milwaukee, WI 53215, (414) 647-1375	MA020
Maple Leaf Micro Ware, P. O. Box 13141, Kanata, Ontario, Canada K2K 1X3, (613) 836-1519	MA030
Matches, 2740 W. San Juan Terrace, Tucson, AZ 85713, (602) 623-7151	MA040
MECA, Inc., P.O. Box 5425, Richmond, VA 23220, (804) 358-0277	ME010

Alphabetical List of Manufacturers

Company	Mfr. No.
Michigan Software, P.O. Box 2091, Ann Arbor, MI 48106	MI010
Microcomputer Games, Inc., A Division of the Avalon Hill Game Co., 4517 Harford Road, Baltimore, MD 21214, (301) 254-5300	MI020
Microcomputers Corporation, 34 Maple Ave, Box 8, Armonk, NY 10504, (914) 273-6480	MI030
Micro-Melamed Software Company, 6130 Coralridge Drive, Corpus Christi, TX 78413, (512) 853-2808	MI040
Microworld, 145 East Norman Dr.,Palatine, IL 60067, (312) 991-9415	MI050
Millers Graphics, 1475 W. Cypress Ave., San Dimas, CA 91773 (714) 599-1431	MI060
Milton Bradley Company, Springfield, MA 01101, (414) 525-6411	MI070
Minerva Communication Centre, 5435 Spring Garden Rd., Halifax, Nova Scotia, Canada B3J 1G1, (902) 429-3268	MI080
Jeffrey Mishlove's Spectrum Software, 190 25th Avenue, San Francisco, CA 94121, (800) 227-1617, ext 396	MI090
Moonbeam Software, 2 Bridge St., Northampton, MA 01060, (413) 586-6290	MO010
Myarc,Inc, P.O. Box 140, Basking, NJ 07920, (201) 766-1700	MY010
NSY Software, 73-32 136th Street, Flushing, NY 11367, (212) 263-8296	N0010
Navarone Industries, 510 Lawrence Expressway #800, Sunnyvale, CA 94086, (209) 835-7402	NA010
Norton Software, Inc., Box 575, Picton, Ontario, Canada K0K 2T0,	NO010
Not-Polyoptics, 13721 Lynn St. #15, Woodbridge, VA 22191, (703) 491-5543	NO020
Oak Tree Systems, 3922 Valentine Road, Whitmore Lake, MI 48189, (313) 426-3480	OA010
OKIDATA, 111 Gaither Drive, Mt. Laurel, NJ 08054, (609) 235-2600	OK010
PTB Software, P.O. Box 332, High Prairie, Alberta, Canada T0G 1E0, (403) 523-2487	P0010
Pablo Diablo, P.O. Box 4863, Santa Clara, CA 95054, SOURCE ID TCV774	PA010
Parallel Systems, Inc., Box 227, Blackwood, NJ 08012, (609) 227-9634	PA020
Pegasus Software, 1438 38th Avenue, Greelely, CO 80634, (303) 352-4903	PE010
Pentacle Software, Route 1, Box 843, Ragley,LA 70657, (318) 725-3104	PE020
Percom Data, 11220 Pagemill Rd, Dallas, TX 75243, (800)527-1222	PE030
Pewterware Computer Software, P. O. Box 503, Gulf Breeze, FL 32561, (904) 932-8660	PE040
Practical Software, P.O. Box 34822, Richmond, VA 23234-0822, (804) 745-0491	PR010
Programs Software, 1435 Burnley Sq. N., Colombus, OH 43229, (614) 436-0219	PR020
Project Works, P.O. Box 8086, Des Moines, IA 50301, (515) 986-3640	PR030
Protoquick Inc., 10636 Main St., Suite 145, Bellevue, WA 98004, (206) 453-0670	PR040
Reality Software, 4615 Kensington Dr., San Diego, CA 92116, (619) 563-6231	RE010
Republic Software, P.O. Box 23042, L'Enfant Plaza, Washington, DC 20024	RE020
Harry P. Richard, 18 Fruitwood Dr., Burnt Hills, NY 12027, (518) 399-7316	RI010
River City Software, Inc, 2836 Melhollin Dr., Jacksonville, FL 32216, (904) 737-0687	RI020
Roach Software, P.O. Box 23241, Lexington, KY 40523	RO010
Romox, 476 Vandell Way, Campbell, CA 95008, (408) 374-7200	RO020
SA2 Software, P.O. Box 2465, Naperville IL 60565, (312) 369-3479	S0010
Scott Compware, 5710 Lee Highway 18, Chattanooga, TN 37421, (615) 894-6831	SC010
Scott, Foresman and Company/Electronic Publishing Division, 1900 E. Lake Av., Glenview, IL 60025, (312) 729-3000, Ext. 2567	SC020
Shenango Enterprises, 19401 Shenango Dr., Tarzana, CA 91356	SH010
Simulsoft, Box 3494, Scottsdale, AZ 85257, (602) 948-8237	SI010
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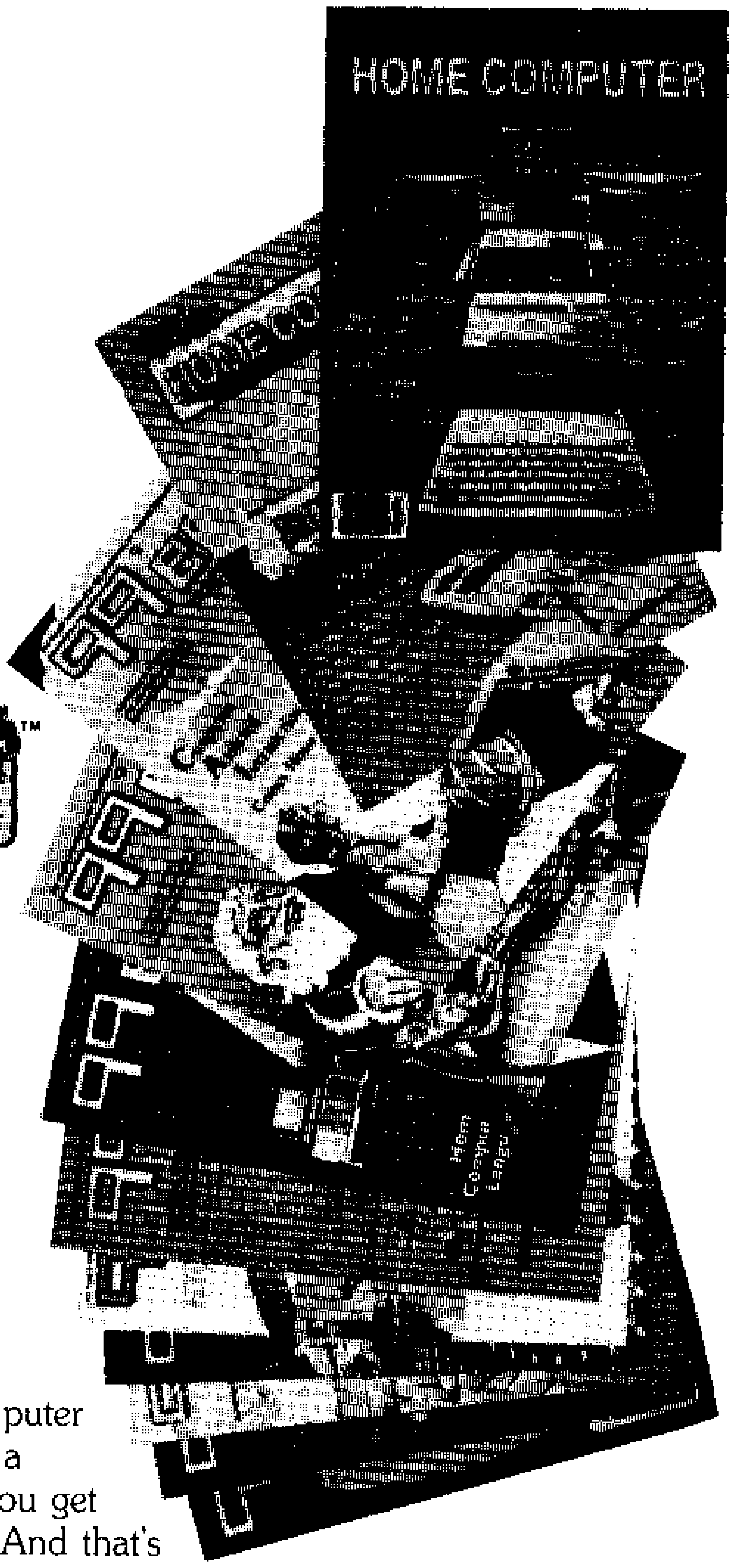

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A Super Language For Kids

Lightning . . . from p. 21

```
330 IF JS=106 THEN 370
340 IF JS=75 THEN 360
350 IF JS<>107 THEN 300
360 JS=0
370 CALL VCHAR(1,1,32,768)
380 CALL POKEV(784,78,78,78,78,
    78,78,78,78)
390 CALL SCREEN(16)
400 RESTORE 410
410 READ A(0),A(1),A(2),A(3),A(
    4),A(5)
420 DATA 32,0,-1,1,0,-32
430 READ J(0,0),J(0,1),J(0,2),J
    (1,0),J(1,1),J(1,2),J(2,0),
    J(2,1),J(2,2)
440 DATA 0,-1,0,32,0,-32,0,1,0
450 CALL CHAR(32,BL$)
460 CALL COLOR(1,13,15)
470 FOR TU=1 TO 4
480 ON RI(4)+1 GOTO 670,490,550
    ,610
490 L=RI(25)+4
500 D=32
510 N=L+32
520 CALL HCHAR(22,1,152,96)
530 CALL VCHAR(22,RI(25)+4,144,
    2)
540 GOTO 730
550 L=(RI(20)+2)*32+30
560 D=-1
570 N=L-1
580 CALL VCHAR(1,1,152,72)
590 CALL HCHAR(RI(20)+2,2,144,2
    )
600 GOTO 730
610 L=RI(25)+746
620 D=-32
630 N=L-32
640 CALL HCHAR(1,1,152,96)
650 CALL VCHAR(2,RI(25)+4,144,2
    )
660 GOTO 730
670 X=RI(20)+2
680 L=X*32+1
690 D=1
700 N=L+1
710 CALL VCHAR(1,29,152,72)
720 CALL HCHAR(RI(20)-2,29,144,
    2)
730 IF OB=0 THEN 800
740 FOR Q=1 TO OB*3
750 CALL HCHAR(RI(15)+6,RI(10)+
    6,128,6)
760 CALL SOUND(50,440,0)
770 CALL VCHAR(RI(12)+4,RI(20)+
    6,128,6)
780 CALL SOUND(50,440,0)
790 NEXT Q
800 IF JS>0 THEN 870
810 CALL KEY(1,K,S)
820 IF S<>1 THEN 920
830 IF K>5 THEN 920
840 IF A(K)=0 THEN 920
850 D=A(K)
860 GOTO 920
870 CALL JOYST(1,JX,JY)
880 JX=JX/4+1
890 JY=JY/4+1
900 IF J(JX,JY)=0 THEN 920
910 D=J(JX,JY)
920 N=L+D
930 CALL PEEKV(N,X)
940 CALL POKEV(L,232,  ,N,240)
950 IF X<>128 THEN 980
960 L=N
970 GOTO 800
980 IF X=240 THEN 1150
990 FOR Y=1 TO 4
1000 CALL POKEV(642,164,169,179,
     161,179,180,165,178)
1010 CALL SOUND(450,110,3,-6,0)
1020 CALL POKEV(642,128,128,128,
     128,128,128,128,128)
1030 NEXT Y
1040 IF SC<=HSC THEN 1060
1050 HSC=SC
1060 CALL CLEAR
1070 CALL SCREEN(12)
1080 PRINT "PRESS ENTER TO PLAY
     AGAIN ORCLEAR TO STOP"
1090 GOSUB 1730
1100 GOSUB 1890
1110 INPUT X$
1120 SC=0
1130 OB=0
1140 GOTO 370
1150 CALL CLEAR
1160 GOSUB 1720
1170 GOSUB 1410
1180 NEXT TU
1190 IF OB=4 THEN 1330
1200 IF OB>0 THEN 1290
1210 CALL CLEAR
1220 CALL CHAR(32,"0")
1230 CALL SCREEN(15)
1240 PRINT :"PRETTY GOOD":::::"
     NOW LET'S TRY WITH SOME":"O
     BSTACLES IN THE WAY!"::"DON
     'T HIT THEM!!!"::::::::
1250 GOSUB 1940
1260 FOR X=440 TO 550 STEP 10
1270 CALL SOUND(200,X,0)
1280 NEXT X
1290 OB=OB+1
1300 CALL CLEAR
1310 CALL CHAR(32,BL$)
1320 GOTO 470
1330 CALL CLEAR
1340 PRINT "CONGRATULATIONS"::::
     "YOU'VE WON THE LIGHT RACE!
     "
1350 GOSUB 1940
1360 GOSUB 1720
1370 FOR I=1 TO 400
1380 NEXT I
1390 STOP
1400 GOSUB 1890
1410 FOR X=1 TO 4
1420 CALL SOUND(100,880,0)
1430 CALL SOUND(100,110,0)
1440 NEXT X
1450 GOSUB 1730
1460 FOR I=1 TO 32
1470 CALL POKEV(I,128)
1480 NEXT I
1490 RETURN
1500 BL$="FF818181818181FF"
1510 X$="FFFFFFFFFFFFFFFF"
1520 CALL CHAR(152,X$)
1530 CALL CHAR(144,X$)
1540 CALL CHAR(136,X$)
1550 CALL CHAR(128,X$)
1560 CALL CLEAR
1570 CALL POKEV(784,245,245,245,
     245,245,245,245,245," ",796,
     208,160,128,16)
1580 CALL POKEV(34,183,165,172,1
     63,175,173,165,128,180,175)
1590 CALL POKEV(130,172,169,167,
     168,180,128,178,161,163,165
     )
1600 FOR X=639 TO 665
1610 CALL POKEV(X,232,240)
1620 NEXT X
1630 FOR X=665 TO 0 STEP -32
1640 Y=X-32
1650 CALL POKEV(X,232," ",Y,240)
1660 NEXT X
1670 CALL SOUND(999,110,0)
1680 CALL CLEAR
1690 CALL POKEV(784,206,206,206,
     206,206,206,206,206)
1700 CALL CLEAR
1710 GOTO 230
1720 SC=SC+100+150*OB
1730 V=SC
1740 P=7
1750 CALL POKEV(2,179,163,175,17
     8,165)
1760 GOSUB 1820
1770 V=HSC
1780 P=25
1790 CALL POKEV(15,168,169,167,1
     68,128,179,163,175,178,165)
1800 GOSUB 1820
1810 RETURN
1820 V$=STR$(V)
1830 LN=LEN(V$)
1840 FOR I=1 TO LN
1850 A$(I)=SEG$(V$,I,1)
1860 CALL POKEV(I+P,ASC(A$(I))+9
     6)
1870 NEXT I
1880 RETURN
1890 FOR I=1 TO 2
1900 CALL VCHAR(22,I,32,3)
1910 CALL VCHAR(22,I+30,32,3)
1920 NEXT I
1930 RETURN
1940 FOR I=1 TO 2
1950 CALL VCHAR(1,I,96,24)
1960 CALL VCHAR(1,I+30,96,24)
1970 NEXT I
1980 RETURN
```

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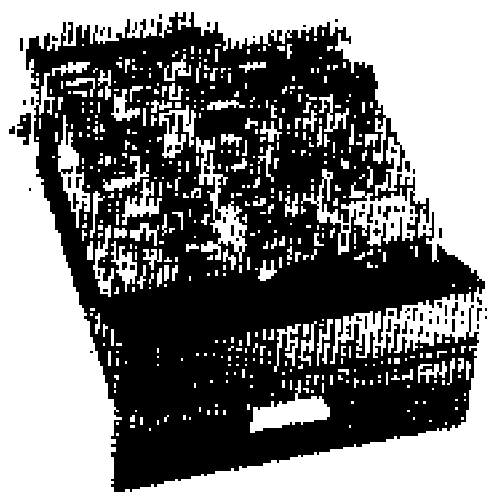

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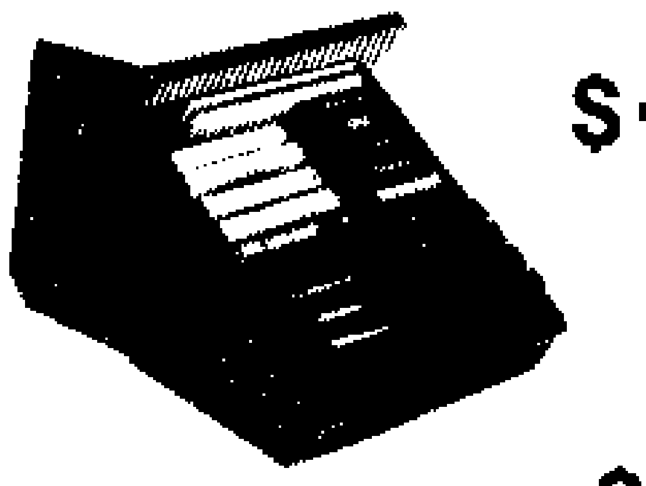

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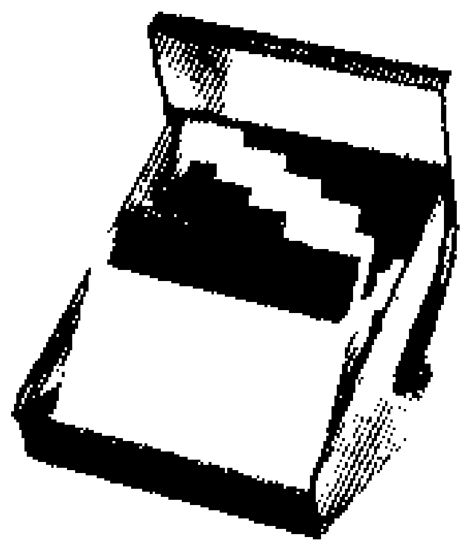

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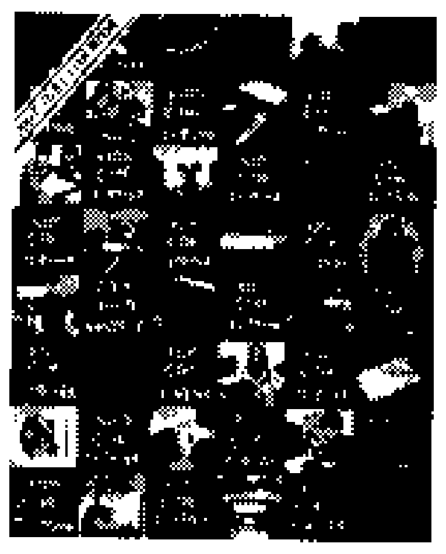

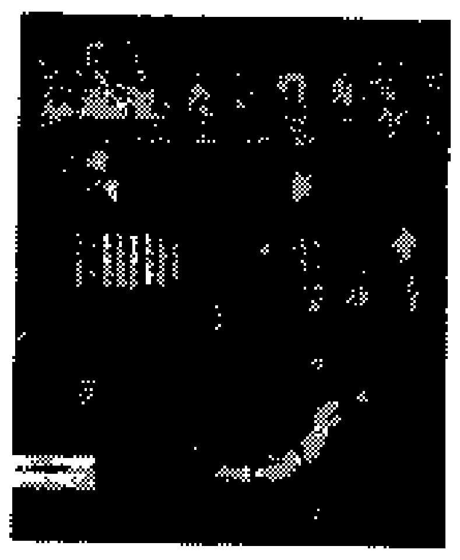

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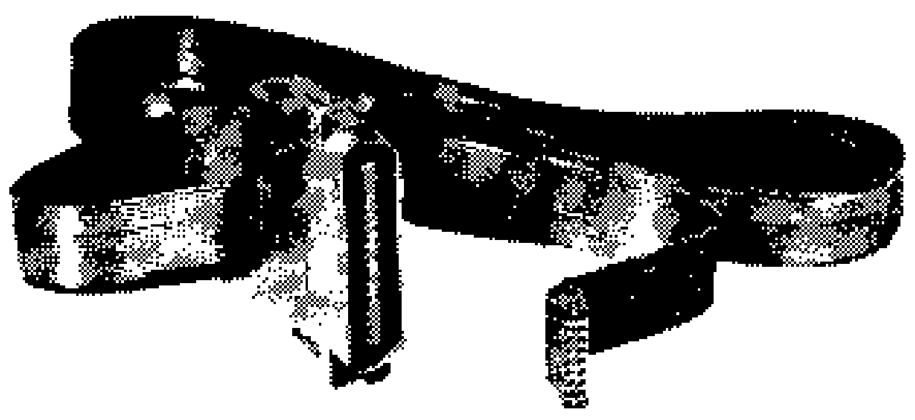

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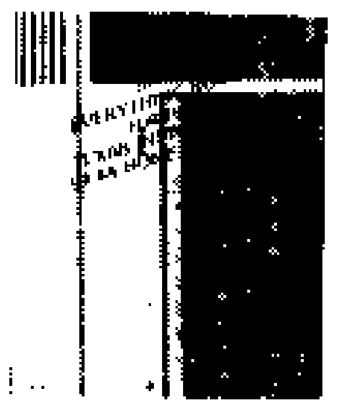

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Peripherals . . . from p. 11

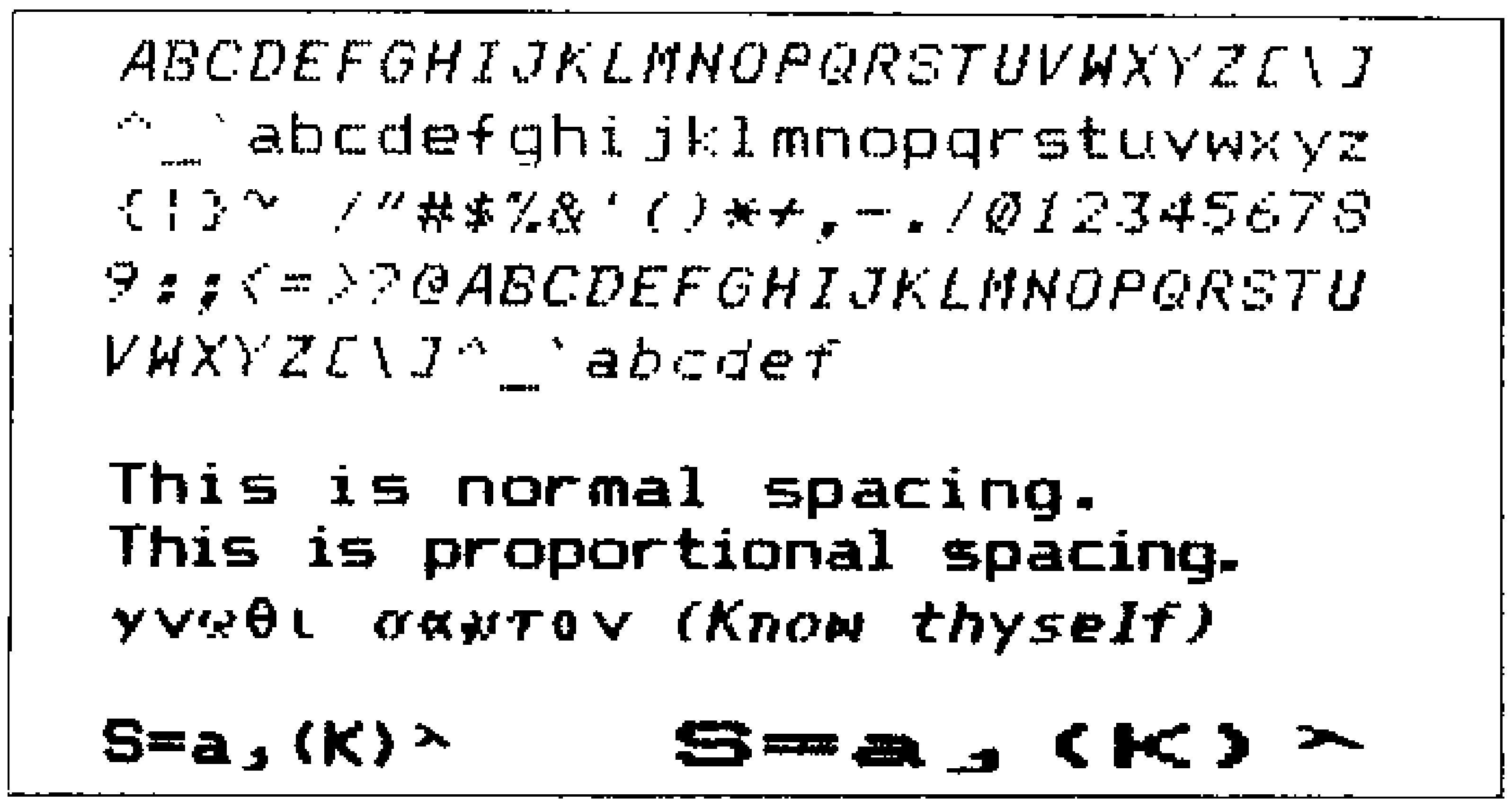
never tried to design letters before, the whole project was "all Greek to me." But by following the clear instructions in the FX-80's excellent 170-page operation manual, I managed to come up with a reasonably good set in four or five hours. High marks go to Epson for providing practice programs in this manual to aid those inexperienced in using printers.

The following routine creates the first three Greek letters (alpha, beta, and gamma) and downloads three ASCII codes characters 65-67, which normally print the letters A, B, and C.

```
100 REM  CREATING CHARACTERS
110 OPEN #1:"PIO"
120 PRINT #1:CHR$(27);"$";CHR$(
0);CHR$(0);CHR$(0);
130 PRINT #1:CHR$(27);"%";CHR$(
1);CHR$(0);
140 FOR KEY=65 TO 67
150 PRINT #1:CHR$(27);"E";
160 PRINT #1:CHR$(27);"&";CHR$(
0);CHR$(KEY);CHR$(KEY);
170 PRINT #1:CHR$(139);
180 FOR J=1 TO 11
190 READ DOT_COL
200 PRINT #1:CHR$(DOT_COL);
210 NEXT J
220 NEXT KEY
230 PRINT #1:"ABC"
240 PRINT #1:CHR$(27);"%";CHR$(
0);CHR$(0);
250 PRINT #1:"ABC"
260 CLOSE #1
270 END
280 REM  ALPHA'S PATTERN
290 DATA 0,8,20,34,34,20,8,20,3
4,0,0
300 REM  BETA'S PATTERN
310 DATA 0,0,63,64,10,64,26,36,
0,0,0
320 REM  GAMMA'S PATTERN
330 DATA 0,16,32,17,10,4,8,16,3
2,0,0
```

Lines 120-130 save the Roman letter patterns so that they can be used after the new characters have been created. The outer loop (140-220) selects the emphasized mode (150), and the KEY is to receive the new pattern (160-170). The inner loop (180-210) reads the patterns from the data statements (270-320). Lines 230-250 print the new characters, switch back to the Roman characters (i.e., ABC), and then print them. Be forewarned that this process is fairly slow in BASIC, and that a bit of trial and error may be required to come up with good-looking characters. Also, keep in mind that you have to run your character creation routine each time the power is applied to the printer.

The FX-80 may be one of the best values in a dot matrix printer today. Bringing together just about every feature available in an under-$1000 printer, and adding a few new ones, it represents another milestone in the advance of printer technology. –*Will Schick*



```
ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]
^_`abcdefghijklmnopqrstuvwxyz
{|}~ /"#$%&'()*+,-./0123456789
9:;<=>?@ABCDEFGHIJKLMNOPQRSTU
VWXYZ[\]^_`abcdef

This is normal spacing.
This is proportional spacing.
γνωθι σαυτον (Know thyself)

S=a,(K)^        S=a,(K)^
```

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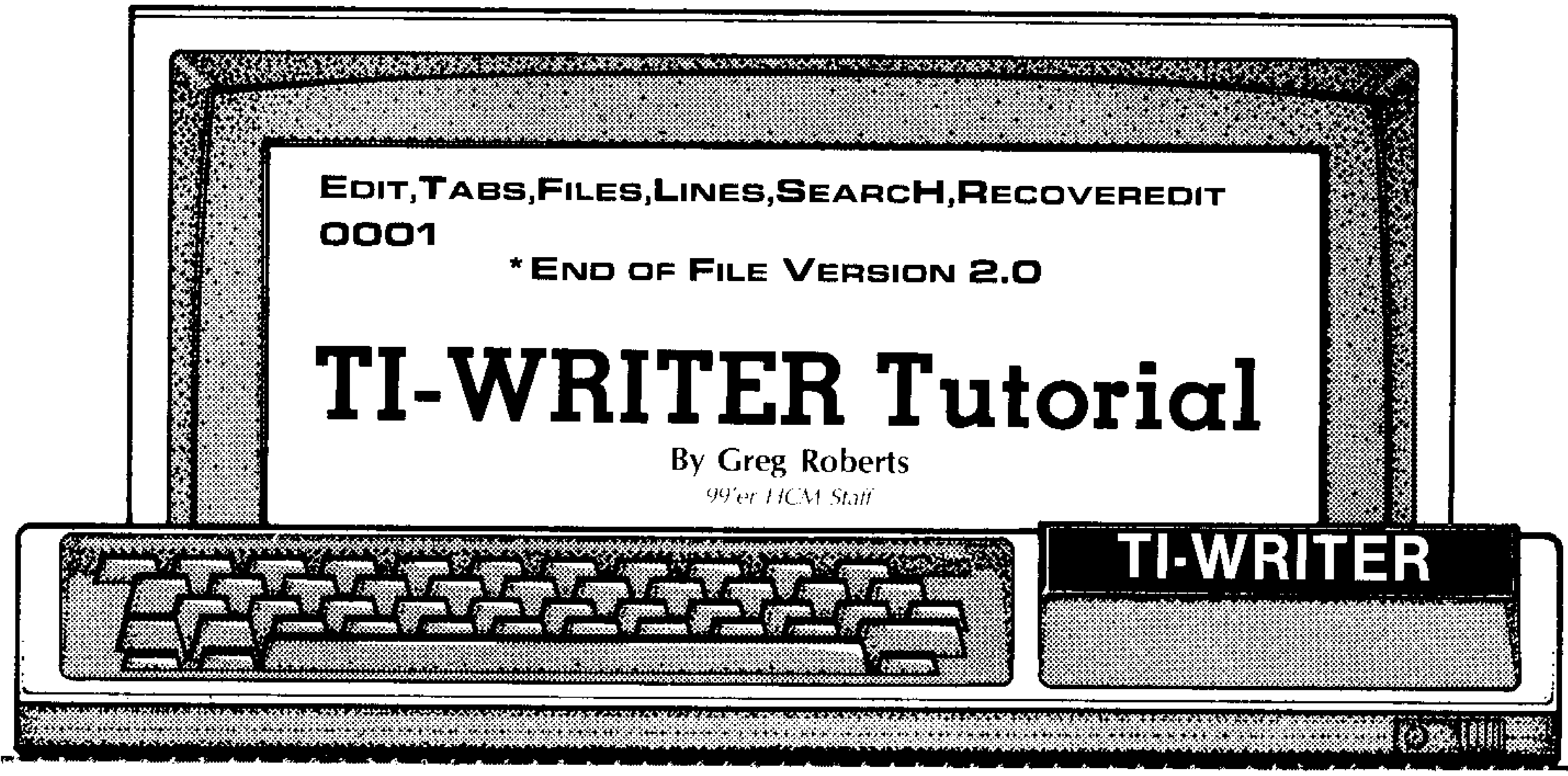

TI-WRITER Tutorial

By Greg Roberts

99'er HCM Staff

The main obstacle to writing with *TI-WRITER* is the Users Manual. Starting out with that complicated book is like learning to swim with the Red Cross Lifeguard's Guide in one hand. And just as you should be able to float in the pool after a single lesson, you can expect to use this word processor after only a few minutes of study.

Your first move is to plug the *TI-WRITER* Command Cartridge into the console and forget about it. Your second is to push in the diskette labeled *TI-WRITER* Word Processor. Why must you handle two pieces of software instead of having it all in the Command Cartridge? There are two reasons: for one, the diskette gives the manufacturer an inexpensive means of updating the program; two, the separate units make for additional programming power.

Once you have the diskette in the drive with all your buttons flipped, push any key to obliterate the color bars, press 2 for *TI-WRITER*, and 1 for TEXT EDITOR. Don't worry about the other two choices, Formatting and Utilities. You won't need them for a while.

After pressing Text Editor, you end up with a screen that looks like this:

```
Edit,Tabs,Files,Lines,SearcH,RecoverEdit

0001
         *End of File Version 2.0
```

At the top of the screen is a list of choices or *command line* that lets you manipulate blocks of data or "files," as they are called. For example, you can "Load" a file (press LF plus [ENTER]) from a diskette to the screen, or "Save" a file (SF plus [ENTER]) by recording it on the diskette. But right now we have no data to manipulate, so let's think about just one command: press E for "Edit" plus [ENTER]. The command line disappears and leaves you with the line number 0001, a blinking cursor, and a senseless little tag that says *End of File Version 2.0. This last is nothing more than a marker for the bottom margin of your text, and a constant reminder that this is the "second-point-zero" version of the software. Why that label couldn't be stuck elsewhere on the program and the bottom margin made from a line of stars or whatever, I can't tell you. Another piece of clutter on the screen is the line number 0001 off to the left. Get rid of it by pressing [FCTN] [0]. Now you can start writing with a clean page.

For our example, try the first line of that old Fats Waller hit, "I'm gonna sit right down and write myself a letter." (By now we're a little tired of the "Quick brown fox" jazz. . . grown-up foxes aren't even brown). As you type, notice that a strange thing happens in the middle of the word "myself": You've run out of room on the screen, so it shifts over, giving you space to make a longer line.

"Hey," you might say, "Now I can't see the first half of the line."

Continued

TI-WRITER Works for *99'er HCM*

Most people would assume that a large magazine such as *99'er HCM* would require the most expensive and sophisticated word processing equipment on the market. Actually, one of the most important tools used in our offices is the *TI-WRITER* word processing package.

When *TI-WRITER* came on the scene last year, a few staff writers started using it to write features and reviews. The buzz-saw sound of dot-matrix printers started to drown out the clacking of typewriters. Before long, those typewriters were silent, except in addressing an occasional envelope or making a label.

New users could handle the word-processing program with just a few minutes of instruction. They started out with a handful of basic editing commands—enough to turn out their articles without delving into all the fine points outlined in the Users Manual.

As soon as our writers start planning a story, they set down their ideas on *TI-WRITER*. The rough notes are stored conveniently at the bottom of the "page" where they can be drawn upon during the actual writing of the piece. Adding a new thought to a file is as easy as keying in a file name on the working diskette—and faster than organizing notes in a paper file.

Writing on the TI console is limited to a column width of forty characters, but it turns out that this size is convenient for magazine production. We normally print a piece in "three-column format" in which each line averages forty characters. By setting the *TI-WRITER* program to a single screen of forty characters, our writers can judge fairly accurately how much magazine space an article will take. This feature is extremely useful in working with our production department. We can tell the paste-up and design people how many column inches to plan for while the article is still in the computer.

When an article is fully edited for publication, the writer runs a cable from the RS232 outlet of the TI Peripheral Expansion Box to a Compugraphic typesetting machine. Using the *TI-WRITER* Print File command, the article can be transferred within seconds. At the Compugraphic, the typesetters quickly key in

Continued

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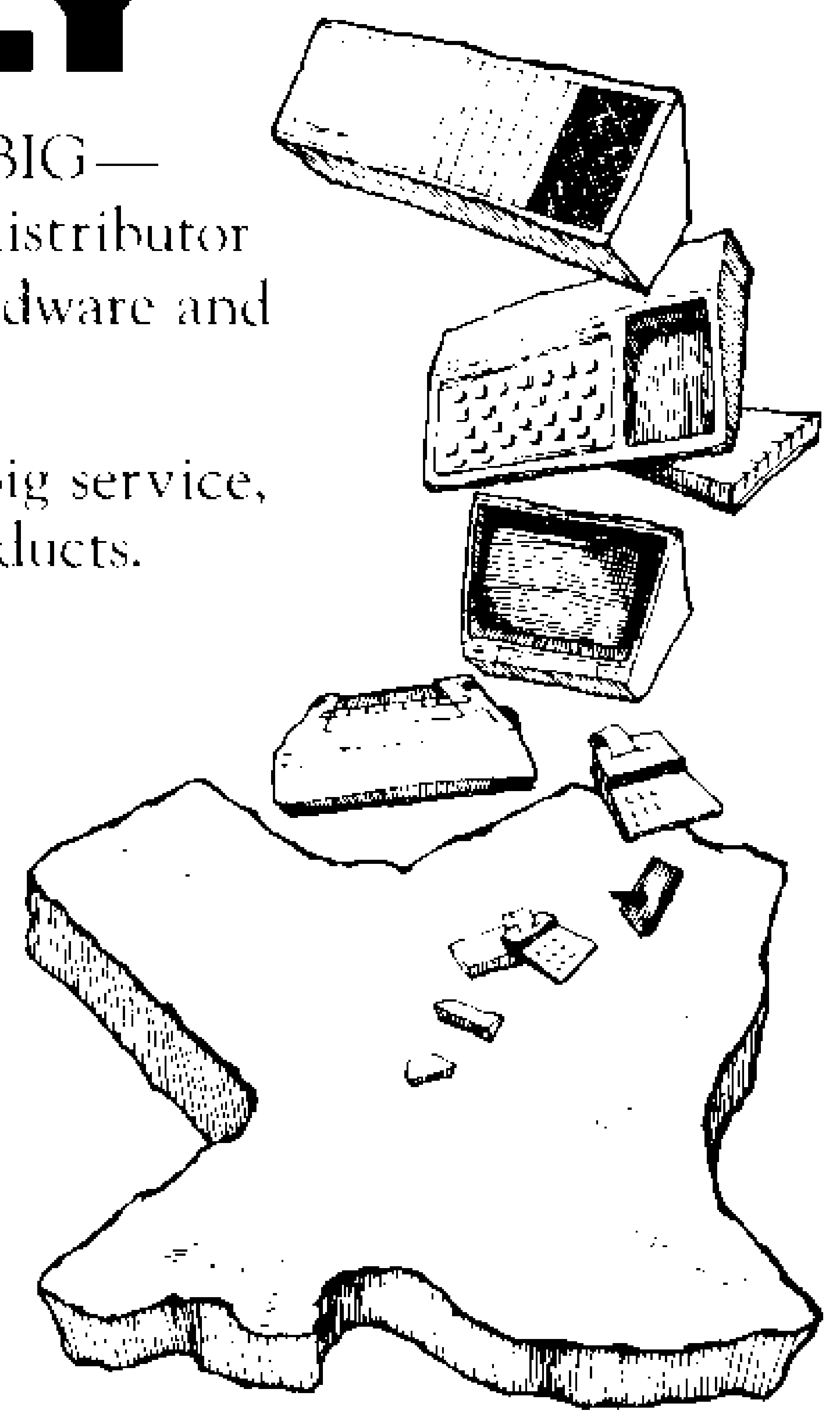

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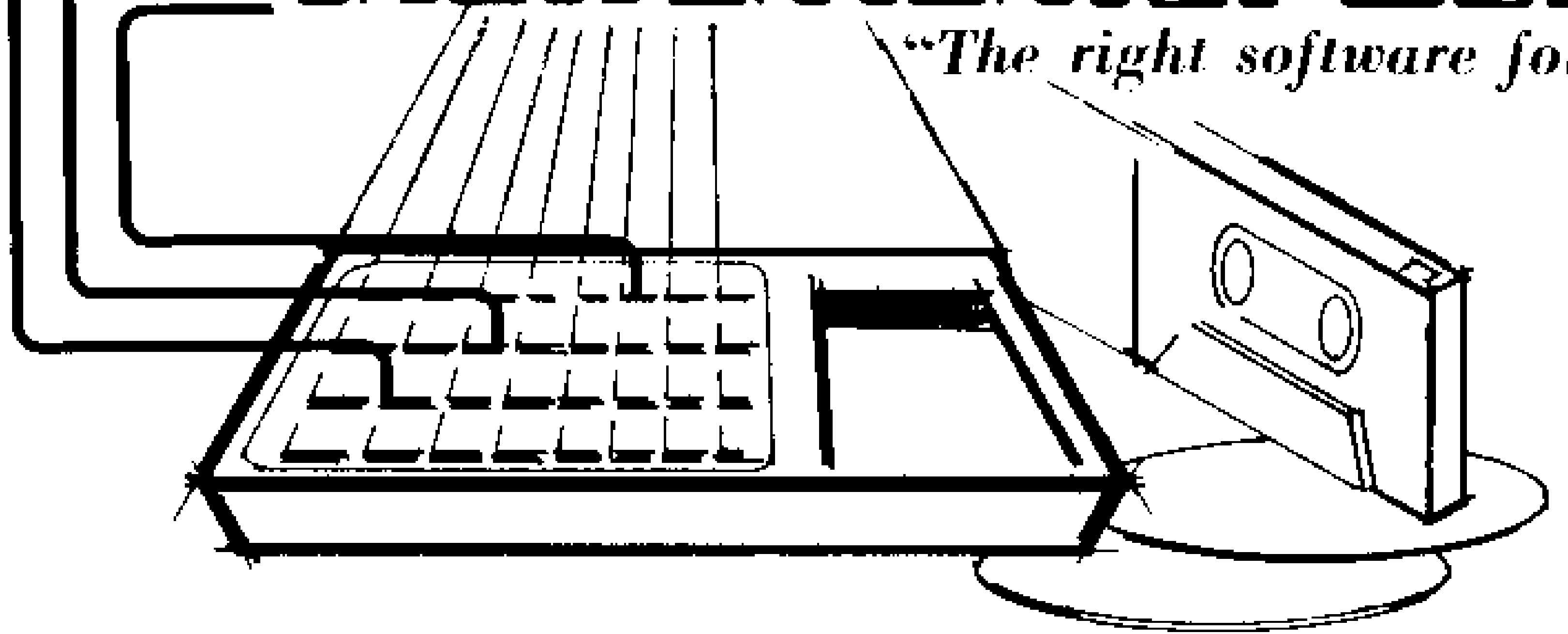

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99'er Computer Literacy Course

Next month we will run the first section of a new series—99'er CLC. In this short feature, we intend to present basic computer concepts in a clear and easily readable form. Each month we plan to cover a different area of computing. We will range from entirely practical how-to articles to the theoretical bases of computing—logic or numbering systems, for instance. Although some readers will be familiar with much of this material, few will know all the facets we intend to cover. Beginners, of course, will find this column helpful, but even oldtimers will run across sections which will broaden their understanding of some fundamental aspect of computing.

Exactly. The equipment can't display more than forty characters at once, so it shifts over to make more room. This feature lets you write an eighty-character line, as in a letter; however, the shift effect is so strange, it would seem easier to stick with forty characters for this first encounter. It's a comfortable width.

How do you set the screen at forty characters? Push [FCTN] [9] again, and you'll see the list of commands. Type T for Tabs, and the computer will show you a line of margin settings. Move your cursor eight spaces to the right of the number 3, type R (for right margin) then [ENTER]. That's all there is to it.

Starting at the left margin, try again with that first line. This time the word "myself" does not go off into the next dimension; instead it "wraps" or goes over to a new line on the same screen. Try it—if you don't know the rest of the Waller tune, you can put down "I Write the Songs," or even a screen full of gibberish; the machine—like the listening public—doesn't seem to care.

Now let's edit that first line. To move your cursor to the top of the screen, or in any direction, simply use the arrow keys plus FCTN. For example, let's change the word "gonna" to "going to." Use the arrow keys to position the cursor above the first "n" and type "ing." Now we have to make room for the additional word "to." Press [FCTN] [2], and the line breaks at the cursor, leaving you room to type in the additional word. Once it's filled in, you can close up your text with [CTRL] [R].

On second thought, we decide that "going to" in this line is a bad choice; it's stiff-sounding, it doesn't swing. So we position our cursor above the "i" in "going," typing "nna" to restore it to the original word. Then press [FCTN] [1] for delete. The two characters rush into oblivion while the line closes up.

Notice when you close up text with [CTRL] [R], every letter and line to the right and bottom of the cursor moves up too. How then, do you keep your paragraphs from being pulled up into one huge block of type? Simple. Just press the [ENTER] key when you finish your paragraph. A tiny "carriage return" symbol blips onto the screen, a mark that designates which paragraph or line will reformat when you push your editing commands. Putting a blank line or two between paragraphs? Just move your cursor to the left of the screen and press [FCTN] [2].

At this point we can arrange text in the simplest format—paragraphs without tabs or indentations. To get a paragraph indentation of say, five spaces, Press [FCTN] [9], then T for Tabs. Space five to the right of your left margin or L, type I (for Indent) and enter it. Now, as you create your separate paragraphs, the cursor will automatically indent five spaces with each new paragraph.

There is one last command to learn before you can do useful work on the word processor. [FCTN] [9] then SF + [ENTER] records your work on diskette. (Prepare or *initialize* a diskette according to the instructions that came with your disk operating system.)

These few moves hardly loosen the cork on *TI-WRITER*'s potential, but now you know enough to use this program on a simple level. In the next installment of this column we will discuss more elaborate maneuvers for manipulating lines and blocks of text.

---

the type fonts and format guidelines for the article.It is then printed out photographically. The editors review final copy for overall visual presentation and hand it over to the paste-up department.

*Here is a sample of type composed on the TI99/4A, then transferred electronically to the typesetting machine, which justifies the line and spaces the characters proportionally.

*Here is a sample of type composed on the TI99/4A, then transferred electronically to the typesetting machine, which justifies the line and spaces the characters proportionally.

Program Processor

TI-WRITER also rides herd on the dozens of submissions that come into this office each week. First manuscripts and diskettes are categorized as games, utilities, or tutorials. We also note the computer language used and the type of audience the program might appeal to. We then file a production history with each submission in order to keep close tabs on the progress of an article from the time it is received to the day of its publication. If a program or manuscript comes to us clearly described as to its language and its general type, we can process it quickly. Our response takes longer when envelopes arrive without detailed cover letters telling us what we hold in our hands.

People not familiar with word processing on the 99/4A may be skeptical that we can carry out serious magazine production with this machine. A year-long problem-free working relationship has proven that *TI-WRITER* can indeed do the job.

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Letters . . . from p. 7

on this method, and this prevents us from calling it a true form of recursion, even though it seems almost like the real thing.

Parle TI Francais?

I am writing to you, in the hope of getting an answer about the availablity of French instructions and manuals for TI products.

I bought a TI-99/4A Computer about a year ago and have since added an Extension Box, Extended BASIC, Memory Card and other like software. All instructions and manuals are in English, which is so far OK with me, but each manual, in Quebec, is accompanied by a label mentioning that if I wish French instructions, I should fill out the label and send it in. For seven months, I have been sending in these coupons but nothing ever happened. Not even a note saying that these French books are out of stock or anything.

I'd like to know: Are these French instruction books really available, or is this just a way to conform with Quebec language laws?

I hope that you or someone else can give me an answer.

G.H. Pothmann
Brossard, PQ Canada

We're sorry to hear about your difficulties obtaining manuals in French. This sounds like it could be a potentially irritating problem for Francophone Canada. Unfortunately, we don't have the answer to your question at this time—delivery of manuals, documentation and the like for TI products are the responsibility of Texas Instruments. Perhaps this public airing will rectify the matter. For whatever it's worth, we have noticed locally some dual-language boxes for the 99/4A with the French version of the manual accompanying the English version.

Two Drives In One?

I need a little information. As I have decided that I cannot do anything really significant without a disk drive, I have decided to buy one. However, it seems to me that two drives would be very handy (especially for backups, and copies of text, etc.). But the PEB only takes one, or so I thought.

I recently noticed a dual drive configuration sold by Western Micro Systems advertised in *99'er Magazine*. What I need to know is, is such a configuration reasonable? I know next to nothing about disk hardware and am particularly concerned about maintenance. Could a dual-sided WMS dual drive possibly compare with a Tandon?

(The reason I am interested in these WMS drives is that I need to conserve space. Therefore, it would be better for me to have both drives inside the PEB rather than one in and one outside.)

Clifford A. Parms
Riverdale, NY

We haven't tested either of the devices you mention, so we really can't give you comparative information about them. While such a configuration does seem reasonable to us, we would want to be sure that the power draw of such a device doesn't exceed the current rating of the PEB, and that the heat the drives might generate is properly dissipated.

The TI THP 1240 Disk Controller Card and the Disk Manager 2 *cartridge will handle dual-sided drives. If you didn't receive a* Disk Manager 2 *cartridge with your controller, contact Texas Instruments at 1-800-858-4075.*

Assembly Language On Cassette

I have noticed some companies are now coming out with the 32K stand-alone memory expansion device. This can be especially nice for those who will be using the Hex-bus peripherals. One of the first questions that popped into my mind was: Is it possible to have assembly language programs with a 32K memory exansion, Extended BASIC, and a standard cassette recorder? If it's possible, why aren't programs available on cassette rather than just disk? If my questions are way off base, I'll settle on buying the Mini Memory Module.

I would like to announce that there is also a test mode in Alpiner. Simply press shift 8-3-8 (In that order) when the title screen appears. it will allow up to 9 (nine) Alpiners to be played and what desired level (level 1-18) to start on. This same mode will also work on munchman. Also, if there's any way of getting past level 14, I would sure like to know.

Erik Hall
Puyallup, WA

It is possible to have Assembly Language programs on cassette, Erik. The Run Program File option of the TI Editor/Assembler permits you to load and run memory image files from cassette. The Save utility that comes on diskette B with the Editor/Assembler permits saving memory image files to cassette. If a file is longer than 8K bytes, the Save utility automatically creates a second file by incrementing the last byte of the file name; the Run Program File option expects files to be linked in this way. To create and run these programs, though, you need the Editor/Assembler, which is a disk-based system.

If you do get the TI Mini Memory cartridge, you can use the Save function in EASYBUG to put Assembly Language programs on cassette. If allows you to write up to 8K bytes of CPU RAM to cassette. In order to use this option, you must know both the starting and ending addresses of your program. In addition, the Load function of EASYBUG allows you to load Assembly Language programs from cassette.

We're sure that our other readers will be glad to get your tips on Alpiner; *in turn, they may be able to get you past level 14.*

Just Scrolling Along

I'd like to congratulate you on a great magazine. I especially like the games and your program tips.

I've had my computer for a couple of years and I'm beginning to program games, but there's one problem I keep on having. The problem is that I can't seem to get the ground to move across the screen like in such games as *Parsec* or in *Alpiner*, where the mountain moves downward when he climbs up.

I have been trying to do this but you can only fit four sprites in a row and it is not enough to fill the screen. I am also having problems moving it by using whole characters, which makes it too choppy.

Is it only possible because of the way the software is made or can you also move the ground in Extended BASIC? If so could you print an article explaining how this could be done?

David Vititoe
Decatur, IL

Although those of us familiar with Extended BASIC immediately think of sprites when we think of moving graphics, sometimes other methods are actually more fruitful and easier to

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99'er Program Bug

DEBUGS ON DISPLAY

Mini Memory Relocator

The following listing is an updated version of the program *Memory Relocator*, which ran in the May, 1983, issue of *99'er HCM*. The instructions for the use of the program contained in that article are still valid, but we want to reiterate some operating parameters for clarification before focusing on the new features of the program.

For the program to move memory correctly, the response to the prompt, FIRST ADDRESS OF MEMORY TO BE RELOCATED? (4 DIGIT HEX ADDRESS):, *must* be the address of the opcode portion of an instruction, because the program expects an opcode to be the first word fetched. This word is then dissected to determine (1) what the instruction's format is, and (2) if the program needs to modify the instruction's offset or change the address in the next word/words in memory. This allows the program to relocate sections of code after updating address/offset pointers. The response to the prompt, LAST ADDRESS OF MEMORY TO BE RELOCATED, *must* be either the last word of an instruction or, in the case of single word instructions, the instruction itself.

Because *Memory Relocator* assumes that it's relocating instructions, data tables cannot be relocated. This is not a problem, however. Because relocated instructions will still have the addresses of the unmoved data tables, they will still access the tables correctly. If you plan the location of data tables carefully, you will still have a powerful editing tool to move the rest of your code.

Memory Relocator will move instructions containing references to the three utilities XMLLNK, DSRLNK and GPLLNK. Because these instructions have DATA statements as the third word of the instruction, the program moves these three word instructions as a group.

With that background, we can examine the program's two new error messages. If the first word of an instruction is not a valid opcode, the program branches to line 3362, which prints: ILLEGAL OPCODE IN LINE *line number*.

The second new error message appears whenever a relocated Jump instruction attempts to point to a target beyond the prescribed offset limit of +128 or −127 words. If the program detects such an error, it branches to line 3372 and prints: OFFSET JMP ADDRESS IN LINE *line number* TOO LARGE. Because of the relative addressing of Jump instructions, the program will only relocate them within their offset limit. If a jump instruction needed to fall more than 128 words away from its target after a move, you should instead substitute a Branch instruction preceded by the appropriate comparison.

Mini Memory Relocator
Explanation of the Program

100-160	Program header.
170-240	Initialize variables.
250-360	Input high and low memory limits.
370-500	Input address to be relocated.
510-610	Input first address to which the memory is to be relocated.
620-680	Input printout option, and print device.
690-990	Input REF/DEF update options.
1010-1030	Set up variables for the start of the transfer.
1080-1130	Get the first word of the instruction.
1131-1138	Check the operand and branch to the appropriate subroutine.
1140-1210	Subroutines to process the various formats.
1220-1230	Place word in the new location.
1250-1790	Update the REF/DEF table and system pointers.
1800-1900	Convert a decimal number to a hexadecimal number.
1910-2030	Subroutine to input a 4-digit hexadecimal address.
2040-2300	Print the transfer report on the screen.
2310-2490	Print the transfer report on the optional printer.
2500-3000	Error message handling routines.
3040-3080	Set up binary conversion array.
3100-3170	Convert a decimal number to binary.
3210-3230	Read keyboard and wait for an input.
3360-3380	Error messages.
4000-4040	Subroutine to check for a third word of data when a Branch Link to GPLLNK, DSRLNK, or XMLLNK is encountered.
5000	Check for single-word instructions in format II.

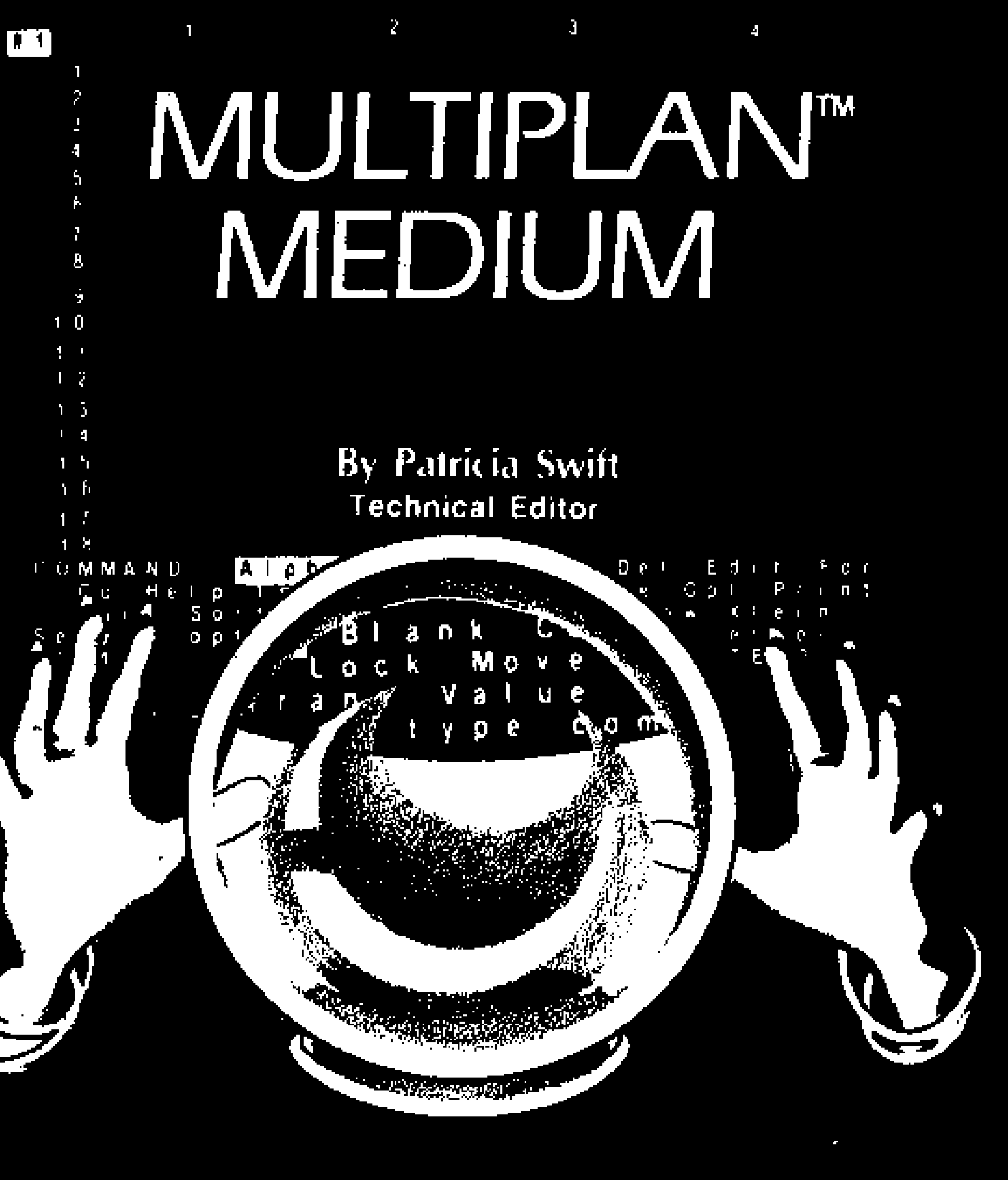
```
100 REM  ********************
110 REM  * MEMORY RELOCATOR *
120 REM  ********************
130 REM  BY MARTIN KROLL JR
140 REM  99'ER VERSION 2.7.2MM
150 REM  REVISED BY 99'ER HCM S
    TAFF
160 REM
170 REM    DEFINE DIVISOR/MULTIP
    LIER FOR NUMBER CONVERSIONS
180 DIM S(4),PNAMES(20),PLOC$(2
    0,2),PE(20)
190 LM=28672
200 HM=32767
210 S(1)=4096
220 S(2)=256
230 S(3)=16
240 S(4)=1
250 CALL CLEAR
260 PRINT "DO YOU WANT TO DO LI
    MIT":"CHECKS FOR MEMORY BOR
    DERS."
270 INPUT "(Y/N)":CT$
280 PRINT : : :
290 IF (CT$<>"Y")*(CT$<>"N")THE
    N 260
300 IF CT$="N" THEN 370
310 PRINT "HIGH MEMORY LIMIT?"
320 GOSUB 1910
330 HM=TN2
340 PRINT "LOW MEMORY LIMIT?"
350 GOSUB 1910
360 LM=TN2
370 PRINT "FIRST ADDRESS OF MEM
    ORY TO  BE RELOCATED?": :
380 GOSUB 1910
390 A=TN2
400 FAPS=TEMP$
410 PRINT "LAST ADDRESS OF MEMO
    RY TO   BE RELOCATED?":
420 GOSUB 1910
430 B=TN2
440 IF B<=A+1 THEN 2970
450 LAP$=TEMP$
460 PRINT "FIRST EXECUTION ADDR
    ESS OF  THE PROGRAM:(ENTRY
    ADDRESS)?": :
470 GOSUB 1910
480 C=TN2
490 EAP$=TEMP$
500 IF (C<A)+(C>B)THEN 2990
510 PRINT "RELOCATE MEMORY TO W
    HICH":"ADDRESS?": :
520 GOSUB 1910
530 D=TN2
580 IF CT$="N" THEN 610
590 IF D<LM THEN 2590
600 IF D+(B-A)>HM THEN 2500
610 NPA$=TEMP$
620 PRINT "DO YOU WANT A PRINTE
    D REPORTON THE CHANGES IN M
    EMORY?"
630 INPUT "(Y/N)":PR$
640 PRINT : : :
650 IF (PR$<>"Y")*(PR$<>"N")THE
    N 620
660 IF PR$="N" THEN 690
670 INPUT "PRINTER DEVICE:":DEV
    $
680 PRINT : : :
690 PRINT "WANT REF/DEF TABLE U
    PDATED?"
700 INPUT "(Y/N)":RD$
720 IF (RD$<>"Y")*(RD$<>"N")THE
    N 690
730 IF RD$="N" THEN 950
740 PRINT : : :
750 PRINT "DO YOU WANT TO REPLA
    CE A":"REF/DEF ENTRY?":
760 INPUT "(Y/N):":RP$
770 IF (RP$<>"Y")*(RP$<>"N")THE
    N 750
780 IF RP$="N" THEN 910
790 INPUT "NAME OF OLD REF/DEF
    TABLE   ENTRY TO BE REPLACE
    D:":NM$
800 NM$=SEG$(NM$&"      ",1,6)
810 CALL PEEK(28702,N,O)
820 RDT=N*256+O
830 IF RDT>32760 THEN 890
840 CALL PEEK(RDT,C1,C2,C3,C4,C
    5,C6)
850 RDT$=CHR$(C1)&CHR$(C2)&CHR$
    (C3)&CHR$(C4)&CHR$(C5)&CHR$
    (C6)
860 IF RDT$=NM$ THEN 910
870 RDT=RDT+8
880 GOTO 830
890 PRINT : : :"NOT IN THE TABL
    E": : :
900 GOTO 750
910 INPUT "NAME OF NEW REF/DEF
    TABLE   ENTRY:":TITLE$
920 TITLE$=SEG$(TITLE$&"       "
    ,1,6)
930 PN=1
940 PNAME$(PN)=TITLE$
950 DIF=A-D
960 C2=C-DIF
970 VA=C2
980 GOSUB 1810
990 PLOC$(1,2)=VAL$
1010 A1=A
1020 B1=B
1030 STP=2
1080 FOR LOC=A1 TO B1 STEP STP
1085 M=0
1090 IF LOC<32768 THEN 1120
1100 LOC1=LOC-65536
1110 GOTO 1130
1120 LOC1=LOC
1130 CALL PEEK(LOC1,X,Y)
1131 OP=X*256+Y
1132 IF OP<512 THEN 3360
1133 IF OP<832 THEN 1140 ELSE 11
     34
1134 IF OP<1024 THEN 1220
1135 IF OP<2048 THEN 1146
1136 IF OP<4096 THEN 1220
1137 IF OP<8192 THEN 5000
1138 IF OP<16384 THEN 1146 ELSE
     1165
1140 IF (OP<720)+(OP>671)=-2 THE
     N 1220
1141 CALL LOAD(LOC-DIF,X,Y)
1142 LOC=LOC+STP
1143 CALL PEEK(LOC,X,Y)
1144 GOTO 1220
1146 GOSUB 3040
1147 T$=SEG$(BIN$,11,2)
1148 IF T$<>"10" THEN 1220
1149 CALL LOAD(LOC-DIF,X,Y)
1150 LOC=LOC+STP
1151 CALL PEEK(LOC,X,Y)
1152 GOTO 1185
1153 IF Y>127 THEN 1160
1154 G=LOC+2+(Y*2)
1155 IF G<=B1 THEN 1220
1156 IF (Y*2+DIF>256)+(Y*2+DIF<-
     254)=-1 THEN 3370
1157 Y=Y+DIF/2
1158 GOTO 1220
1160 G=LOC+2+((Y-256)*2)
1161 IF G>=A1 THEN 1220
1162 IF ((Y-256)*2+DIF<-254)+((Y
     -256)*2+DIF>256)=-1 THEN 33
     70
1163 Y=((Y-256)*2+DIF)/2
1164 GOTO 1220
1165 GOSUB 3040
1166 M=0
1167 T1$=SEG$(BIN$,11,2)
1168 T2$=SEG$(BIN$,5,2)
1169 IF (T1$<>"10")*(T2$<>"10")T
     HEN 1220
1171 IF T1$<>"10" THEN 1173
1172 M=M+1
1173 IF T2$<>"10" THEN 1175
1174 M=M+1
1175 CALL LOAD(LOC-DIF,X,Y)
1176 FOR N=1 TO M
```

```
1177 LOC=LOC+STP
1178 CALL PEEK(LOC,X,Y)
1185 Z=X*256+Y
1186 IF (Z>=A1)+(Z<=B1)=-2 THEN
     1187 ELSE 4000
1187 V=Z-DIF
1188 IF CT$="N" THEN 1200
1189 IF (V>LM-1)*(V<HM+1)THEN 12
     00
1190 GOSUB 2660
1200 X=INT(V/256)
1210 Y=V-X*256
1220 CALL LOAD(LOC-DIF,X,Y)
1222 IF M=0 THEN 1230
1225 NEXT N
1230 NEXT LOC
1250 REM  UPDATE REF/DEF TABLE

1260 CALL PEEK(28700,L,M,N,O)
1270 FFAM=L*256+M
1280 LFAM=N*256+O
1290 IF (RP$="Y")+(RD$="N")THEN
     1310
1300 LFAM=LFAM-8
1310 VA=LFAM
1320 GOSUB 1810
1330 LAVAIL$=VAL$
1340 PLOC$(1,1)=VAL$
1350 FFAM=B-DIF+2
1360 VA=FFAM-2
1370 GOSUB 1810
1380 FAVAIL$=VAL$
1385 IF RD$="N" THEN 1590
1390 L=INT(FFAM/256)
1400 M=FFAM-L*256
1410 N=INT(LFAM/256)
1420 O=LFAM-N*256
1430 CALL LOAD(28700,L,M,N,O)
1440 IF RP$="N" THEN 1470
1450 LOC=RDT
1460 GOTO 1480
1470 LOC=LFAM
1480 FOR SS=1 TO 6
1490 CALL LOAD(LOC,ASC(SEG$(TITL
     E$,SS,1)))
1500 LOC=LOC+1
1510 NEXT SS
1520 J=INT(C2/256)
1530 K=C2-J*256
1540 IF RP$="N" THEN 1570
1550 CALL LOAD(RDT+6,J,K)
1560 GOTO 1580
1570 CALL LOAD(LFAM+6,J,K)
1580 PN=PN+1
1590 IF LFAM+((PN-1)*8)>32760 TH
     EN 2040
1600 CALL PEEK(LFAM+((PN-1)*8),C
     1,C2,C3,C4,C5,C6,A1,A2)
1610 PNAME$(PN)=CHR$(C1)&CHR$(C2
     )&CHR$(C3)&CHR$(C4)&CHR$(C5
     )&CHR$(C6)
1620 VA=A1*256+A2
1630 GOSUB 1810
1640 PLOC$(PN,2)=VAL$
1650 VA=LFAM+((PN-1)*8)
1660 GOSUB 1810
1670 PLOC$(PN,1)=VAL$
1680 GOTO 1580
1690 REM CONVERT TO DECIMAL
1700 TN2=0
1710 FOR P=1 TO 4
1720 TEMP2$=SEG$(TEMP$,P,1)
1730 IF ASC(TEMP2$)>57 THEN 1780
1740 TN=ASC(TEMP2$)-48
1750 TN2=TN2+TN*S(P)
1760 NEXT P
1770 RETURN
1780 TN=ASC(TEMP2$)-55
1790 GOTO 1750
1800 REM CONVERT TO HEX
1810 VAL$=""
1820 FOR P=1 TO 4
1830 V=INT(VA/S(P))
1840 VA=VA-(V*S(P))
1850 IF V>9 THEN 1880
1860 VAL$=VAL$&STR$(V)
1870 GOTO 1890
1880 VAL$=VAL$&CHR$(V+55)
1890 NEXT P
1900 RETURN
1910 INPUT "(4 DIGIT HEX ADDRESS
     ):":TEMP$
1920 IF LEN(TEMP$)>4 THEN 1910
1930 IF LEN(TEMP$)=4 THEN 1950
1940 TEMP$=SEG$("0000"&TEMP$,LEN
     (TEMP$)+1,4)
1950 FOR TT=1 TO 4
1960 TT1=ASC(SEG$(TEMP$,TT,1))
1970 IF (TT1<48)+(TT1>70)+((TT1>
     57)*(TT1<65))THEN 1910
1980 NEXT TT
1990 GOSUB 1700
2000 IF CT$="N" THEN 2020
2010 IF (TN2<LM)+(TN2>HM)THEN 28
     50
2020 PRINT : : :
2030 RETURN
2040 CALL CLEAR
2050 PRINT TAB(19);"OLD    NEW"
2060 PRINT "FIRST ADD.";TAB(19);
     FAP$;TAB(25);NPA$
2070 PRINT "LAST ADD.";TAB(19);L
     AP$;TAB(25);FAVAIL$
2080 PRINT "ENTRY POINT";TAB(19)
     ;EAP$;TAB(25);PLOC$(1,2)
2090 PRINT "REF/DEF STARTS AT";T
     AB(25);LAVAIL$
2100 PRINT "MEMORY RELOCATED ";(
     -1)*DIF;"BYTES"
2110 PRINT : : :
2120 PRINT "REF/DEF TABLE ENTRIE
     S"
2130 SS1=1
2140 PRINT :"LOCATION NAME
     ENTRY"
2150 FOR SS=SS1 TO SS1+6
2160 IF SS=21 THEN 2250
2170 IF PNAME$(SS)="" THEN 2250
2180 PRINT PLOC$(SS,1);TAB(12);P
     NAME$(SS);TAB(22);PLOC$(SS,
     2)
2190 NEXT SS
2200 PRINT : :"PRESS ENTER TO CO
     NTINUE"
2210 CALL KEY(0,K,S1)
2220 IF S1=0 THEN 2210
2230 SS1=SS
2240 GOTO 2150
2250 IF PR$="Y" THEN 2270
2260 PRINT : :"RECORD ALL DATA,
     AND"
2270 PRINT "PRESS ENTER TO CONTI
     NUE"
2280 GOSUB 3210
2300 IF PR$="N" THEN 2490
2310 OPEN #1:DEV$
2320 PRINT #1:"MEMORY RELOCATION
      REPORT": : :
2330 PRINT #1:TAB(25);"OLD";TAB(
     35);"NEW"
2340 PRINT #1:"FIRST ADDRESS";TA
     B(25);FAP$;TAB(35);NPA$
2350 PRINT #1:"LAST ADDRESS";TAB
     (25);LAP$;TAB(35);FAVAIL$
2360 PRINT #1:"ENTRY POINT";TAB(
     25);EAP$;TAB(35);PLOC$(1,2)
2370 PRINT #1:"REF/DEF STARTS AT
     ";TAB(35);LAVAIL$
2380 PRINT #1: : :"MEMORY RELOCA
     TED";(-1)*DIF;"BYTES"
2390 PRINT #1: : : : : :
2400 PRINT #1:"REF DEF TABLE ENT
     RIES"
2410 PRINT #1: :
2420 PRINT #1:"LOCATION";TAB(12)
     ;"NAME";TAB(25);"REF/DEF EN
     TRY POINT"
2430 FOR SS=1 TO 20
2440 IF PNAME$(SS)="" THEN 2470
2450 PRINT #1:PLOC$(SS,1);TAB(12
     );PNAME$(SS);TAB(25);PLOC$(
     SS,2)
2460 NEXT SS
2470 PRINT #1: : : :"END OF REPO
     RT"
2480 CLOSE #1
2490 STOP
2500 PRINT : : : :"YOU ARE TRYIN
     G TO MOVE ABOVEYOUR LIMIT"
2510 VA=D+(B-A)
2520 GOSUB 1810
2530 PRINT "HIGH LIMIT NEEDS TO
     BE";VAL$
2540 PRINT : : :"DO YOU WISH TO
     CHANGE THE    PARAMETERS?"
2550 INPUT "(Y/N):":CHP$
2560 PRINT : : :
2570 IF (CHP$<>"N")*(CHP$<>"Y")T
     HEN 2540
2580 IF CHP$="Y" THEN 190 ELSE 6
     20
2590 PRINT : : : :"YOU ARE TRYIN
     G TO MOVE BELOWYOUR LIMIT":
     : :
2600 PRINT "YOUR LOW LIMIT NEEDS
      TO BE":TEMP$: : :
2610 PRINT "DO YOU WISH TO CHANG
     E THE PAPAMETERS?"
2620 INPUT "(Y/N):":CHP$
2630 PRINT : : :
2640 IF (CHP$<>"Y")*(CHP$<>"N")T
     HEN 2610
2650 IF CHP$="Y" THEN 190 ELSE 6
     10
2660 VA=V
2670 GOSUB 1810
2680 TO$=VAL$
2690 VA=Z
2700 GOSUB 1810
2710 FROM$=VAL$
2720 VA=LOC1
2730 GOSUB 1810
2740 PRINT : : : :"YOUR PROGRAM
     WILL NEED TO   WORK OUTSIDE
      OF YOUR LIMITS"
2750 PRINT : :"THE INSTRUCTION A
     T LOCATION":VAL$;" ORIGINAL
     LY USED THE":"ADDRESS REFER
     ENCE ";FROM$;"."
2760 PRINT : :"IT NOW NEEDS TO C
     HANGE THAT ADDRESS REFERENC
     E TO ";TO$;".": : : : :
2770 PRINT "DO YOU WISH TO HALT
     THIS":"PROGRAM AND START OV
     ER?"
2780 INPUT "(Y/N):":CHP$
2790 PRINT : : :
2800 IF (CHP$<>"N")*(CHP$<>"Y")T
     HEN 2770
2810 IF CHP$="Y" THEN 2830
2820 RETURN
2830 PRINT : : : :"YOU MUST RELO
     AD MEMORY WITH YOUR ASSEMBL
     Y PROGRAM BEFOREUSING THIS
     PROGRAM AGAIN": : : : : :
2840 STOP
2850 PRINT : : : :"THAT ADDRESS
     IS OUTSIDE OF  YOUR LIMITS"
     : :
2860 VA=HM
2870 GOSUB 1810
2880 PRINT "HIGH MEMORY LIMIT=";
     VAL$
2890 VA=LM
2900 GOSUB 1810
2910 PRINT "LOW MEMORY LIMIT=";V
     AL$
2920 PRINT : :"YOUR INPUT WAS FO
     R ADDRESS":TEMP$: :
2930 PRINT "IS THIS A VALID ADDR
     ESS?"
2940 INPUT "(Y/N):":CHP$
2950 IF (CHP$<>"Y")*(CHP$<>"N")T
     HEN 2920
2960 IF CHP$="Y" THEN 2030 ELSE
     190
2970 PRINT : : :"YOU HAVE ENTERE
     D A LAST":"ADDRESS LOWER TH
     AN OR EQUAL TO THE FIRST AD
     DRESS": : :
2975 GOSUB 3210
2980 GOTO 190
2990 PRINT "THE ENTRY ADDRESS MU
     ST BE":"BETWEEN THE FIRST,
     AND LAST ADDRESSES. TRY AGA
     IN"
2995 GOSUB 3210
3000 GOTO 190
3040 RESTORE 3080
3050 FOR D=0 TO 15
3060 READ PE(D)
3070 NEXT D
3080 DATA 32768,16384,8192,4096,
     2048,1024,512,256,128,64,32
     ,16,8,4,2,1
3100 REM CONVERT TO BINARY
3110 BIN$=""
3120 FOR C=0 TO 15
3130 BIN=INT(OP/PE(C))
3140 OP=OP-(BIN*PE(C))
3150 BIN$=BIN$&STR$(BIN)
3160 NEXT C
3170 RETURN
3210 CALL KEY(0,K,ST)
3220 IF ST=0 THEN 3210
3230 RETURN
3360 VA=LOC1
3361 GOSUB 1810
3362 PRINT "ILLEGAL OPCODE IN AD
     DRESS:":VAL$
3365 STOP
3370 VA=LOC
3371 GOSUB 1810
3372 PRINT "OFFSET JUMP ADDRESS
     IN LINE:":VAL$
3375 PRINT "TOO LARGE."
3376 GOSUB 3210
3378 GOTO 190
3380 END
4000 IF (Z<>24632)*(Z<>24600)*(Z
     <>24604)THEN 1220
4010 CALL LOAD(LOC-DIF,X,Y)
4020 LOC=LOC+STP
4030 CALL PEEK(LOC,X,Y)
4040 GOTO 1220
5000 IF OP>=7424 THEN 1220 ELSE
     1153
```

MULTIPLAN™ MEDIUM

By Patricia Swift
Technical Editor



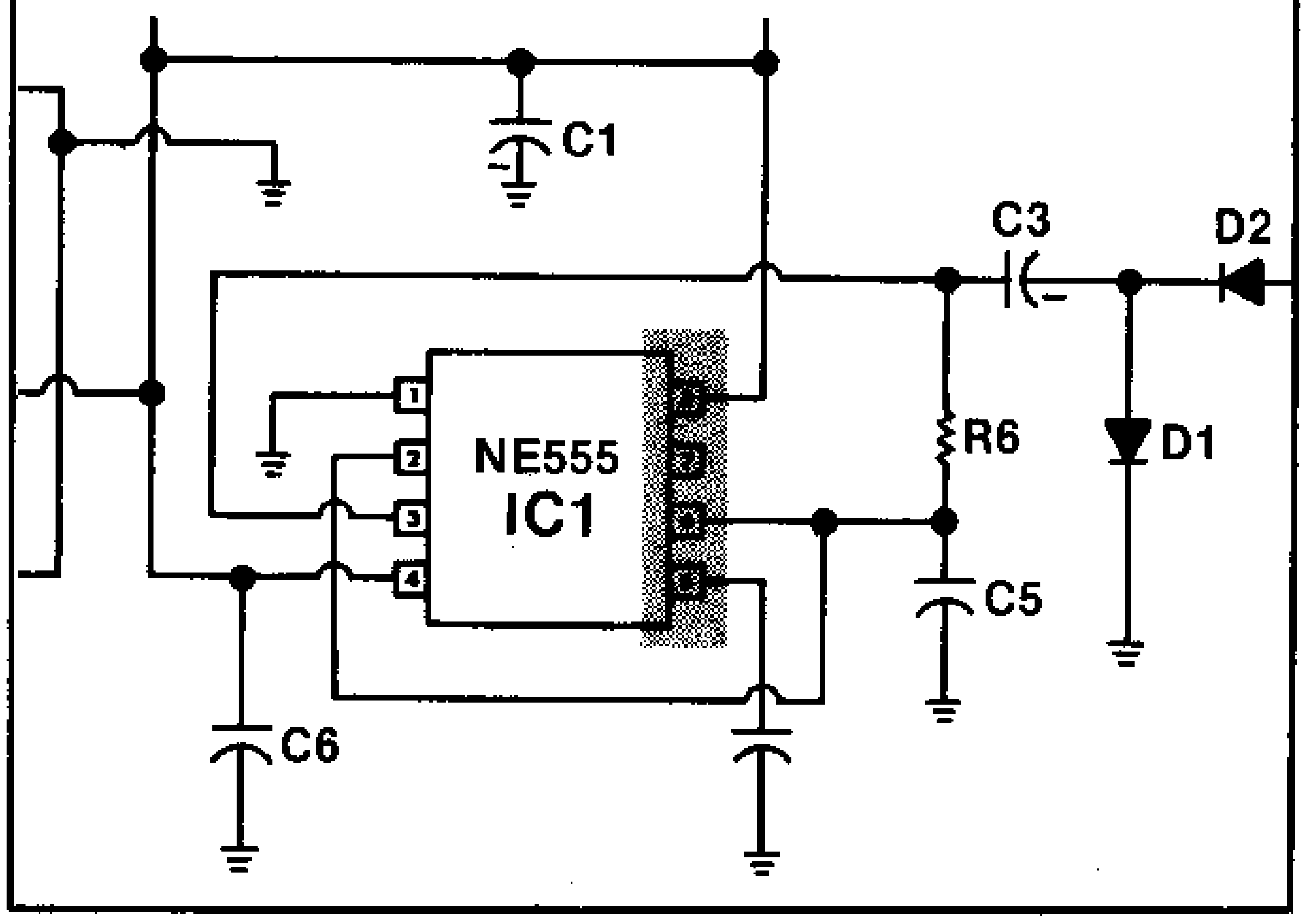
Even mediums need time to meditate and the Multiplan Medium is no exception. Patricia Swift will continue to unveil the mysteries of Multiplan, beginning again with the October issue of 99'er HCM.

DEBUGS ON DISPLAY

99'er Program Bug

By George, we blew it in the article in the July, 1983 issue on page 29. We forgot to say that *Speller* needs the *Terminal Emulator II* in order to RUN. Our editorial staff extends a heart-felt apology to all of you who do not have the *Terminal Emulator II* cartridge and, trusting us, keyed in the *Speller* program. We hope you will at least be able to find someone in your User's Group who will loan you the cartridge so you can enjoy the fruits of your efforts occasionally. We certainly will guard against such an oversight happening again.

One of our sharp-eye readers caught another error in *JoyTalk* (June, 1983, p. 62). The NE555 Integrated Circuit Timer (IC1 on the schematic, p. 65) had its pins numbers 5-8 labeled backwards. The accompanying diagram has the correct labeling.



implement. In the application you have in mind, for instance, you can define characters that represent the background with CALL CHAR statements. You can then fill and empty successive rows (or columns) on the screen using CALL HCHAR (or CALL VCHAR). In effect, you are scrolling the background across the screen. The techniques used in Pocket Sunrise *put images on the screen in a fashion something like you desire. A careful study of these techniques should set you on your way, David.*

REF/DEF Blues

It is a pleasure for me to write to you and to say that after looking at other computer magazines, I came to the conclusion that the 99'er is the best magazine in existence. I have great interest in Assembly Language so I bought the Mini Memory Module, but in order to run the programs one makes a name has to be inserted in the program in order for it to run when it's name is typed in the RUN option of the module. Unfortunately, the manual that comes with the cartridge explains this procedure in a very complicated way. I have not been able to use the cartridge because of this problem. If it's possible, write me a small Assembly Language program in a ready-to-type-and-run form with its name already assigned to it, so in this way I can see how its done. Then I can use the same steps to assign names in other programs. Thank you very much for your help.

Mike Cavaglieri
Cypress, CA

We agree, Mike, that the explanation in the manual for the Line-By-Line Assembler makes for tough reading. We did run a relatively short Assembly Language program by Pat Swift (April, 1983, p. 60) that uses Mini Memory. It was intended as a tutorial, and includes a step-by-step description of the process for writing the program. The last step contains a discussion of the procedures necessary to set up the REF/DEF table for this program. This could be what you're looking for.

Unfortunately, the program listing as it was printed in the magazine contained a bug, and that bug happened to fall in the section that sets up the REF/DEF table. The following is the corrected code for Part 13 of that program:

```
AORG   >7FE8      * GETS YOU INTO
                  * DEF TABLE
TEXT   'SPRITE'   * DEFINES PROGRAM
                  * NAME
DATA   >7D5C      * START OF
                  * PROGRAM
AORG   >701E      * GETS INTO TABLE
                  * POINTER
DATA   >7FE8      * DEF TABLE POINTER
                  * ADDRESS
END
```

Plain English

First, I would like to commend you for the fine job you and your staff does printing the *99'er HCM*. It comes in handy.

Second, I would like a few questions answered. I just recently received an Extended BASIC Cartridge and I have learned a lot using it. I am baffled by one subprogram: CALL PEEK. What use is CALL PEEK if one can't CALL POKE? From what I understand, PEEK returns the variables and POKE changes them. How do you change them? AND, what would you change?

I have another problem. I don't understand the use of files. Is there any way to just print plain English, like writing a story, and have the computer record it on cassette or disk with only a minimal system (keyboard and memory device)?

It would be nice if your magazine would expand. It offers a wide spectrum of interests, but on each of these, you seem to spread yourselves too thinly. It would be nice if you had a section on helpful hints. Especially in graphics and sound effects.

Thank you for a fine magazine, but I wish it were larger.

Michael Cheek
Woodstock, GA

In Extended BASIC, CALL POKE runs under a pseudonym: CALL LOAD. When this utility has a name in its parameter list—CALL LOAD("accessname"*)—it calls an Assembly Language subprogram and loads it in the expansion memory. It also can be used to load data directly into memory locations, however. In this application, the parameter list contains a starting address along with data to be put in that address. The following parameters are data to be loaded into addresses in sequence following the starting address. For instance, CALL LOAD(12326,32,32,32,32) puts the value 32 in four successive memory locations, starting with address 12326. So CALL LOAD is really a double-duty utility.*

There are any number of reasons to change the values in particular memory locations—it all depends on your specific needs. The game program Light Race *in this issue ("Byte Lightning," p. 17) uses two similar utilities, PEEKV and POKEV, to write to the TI 99/4A's VDP RAM. This may help you understand the use of these utilities.*

Continued on p. 54

Excerpts from the

99'ER DIGEST™

of news & happenings in the Home Computer world

HOME COMPUTER PERIPHERAL PRICES PLUNGE

The suggested retail price (SRP) of TI's Disk Drive Memory System (Peripheral Expansion Box, Disk Controller, Disk Drive, and 32K Memory Card), which formerly carried an SRP of $1200, has been slashed to $550 for the bundled system. This new pricing supersedes the PES promo TI announced at Chicago CES. TI will provide stock balancing and price protection on retailers' current inventory. To encourage ordering, TI supplies dealers with one free software application package (their choice of either *TI-WRITER*, TI LOGO II, or *Microsoft Multiplan*) for each complete system ordered. The software may be sold separately or bundled with the system. With the accompanying reduction in SRP of TI LOGO II from $129.95 to $99.95, each software pack carries a stand-alone price of $99.95. Other peripheral price cuts include the p-Code Card from $250 to $100; the RS232 Card from $175 to $100; the Telephone Coupler from $200 to $100; and the TI Impact Printer from $750 to $500. The RS232 Card and printer are required for *TI-WRITER* and recommended for *Microsoft Multiplan*. According to Gary Rado, Marketing Manager and Vice-President of TI's Consumer Group, "These prices will allow TI retailers to offer a competitive Home Computer system that will perform more sophisticated software applications than ever before." Consumers may soon see the Disk Drive Memory System with application software at a package price of $500 or under. Slashes in SRP for TI peripherals translate into complete, powerful productivity systems for under $1,000!

"TI-CARES" ABOUT GIVING CONSUMERS REASONS TO BUY

TI now offers a mnemonic toll-free question and answer line, 1-800-TI-CARES, that acts as a central switchboard for all their toll-free hotlines. As another incentive to "Buy TI" a certificate for a free two and a half hour introductory computer course (plus a two and a half hour Q & A lab period) will be boxed with each Home Computer console. If attending class is inconvenient, a consumer may alternately select the *Teach Yourself* BASIC cassette software. This starts off an early end-of-year push to gain market share and clear out inventory. TI also extends the warranty on Home Computers from 90 days to one year. Why? Because TI CARES.

TI SIGNS PACT WITH "THE ARCADE EXPERTS"

In addition to their acquisition of Spinnaker's *Facemaker* and *Story Machine* educational software, TI recently picked up Sega's implementations of *Congo Bongo*, *Star Trek*, and *Buck Rogers: Planet of Zoom*. As in other TI/third-party agreements, Sega (a leader in coin-op amusements and video games for the home) will supply videogame software designs for TI to manufacture and market. Increasing numbers of arcade game manufacturers are now coming "on line" with TI's software licensing program because the short lifespan of arcade games suggests a strategy that it's better to catch incremental sales from the large TI user base before a game gets too old and loses much of its player appeal.

FAIRS AND AMUSEMENT PARKS GO COMPUTER

TI's Consumer Group will be represented nationwide at 14 state fairs this summer and fall. Exhibits featuring the 99/4A will reach an expanded market with TI's Product Service Representatives demonstrating educational, entertainment, and information management applications in Arizona, California, Indiana, Kentucky, Louisiana, Minnesota, New Mexico, New York, North Carolina, Ohio, Oklahoma, Texas, Washington, and Wisconsin. In addition, Six Flags Magic Mountain amusement park in Valencia, CA, will feature a 3000 square foot Computer Discovery Center sponsored by TI. Forty 99/4A systems and a short Cosby-narrated film will be exhibited. This second-half foray signifies TI's willingness to explore less-traditional marketing methods in an attempt to reach a wider base of consumers who aren't ordinarily exposed to computers.

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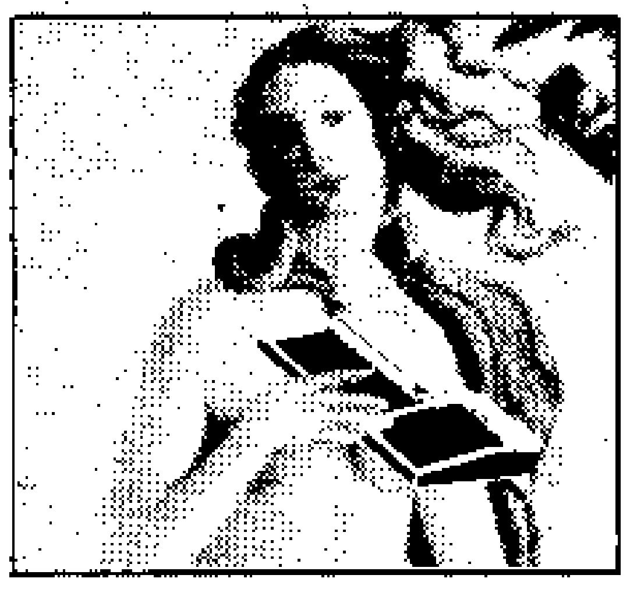
GROUP GRAPEVINE

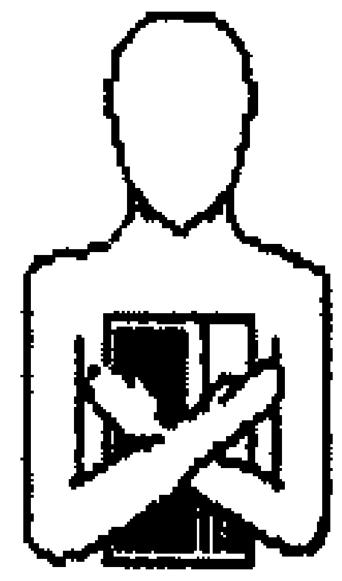
Group Grapevine: News of TI Users Groups From Around the World

A common users group dilemma: your newsletter circulation is burgeoning but your bank account is dwindling. What to do? We assume you've already turned down the member who offered to sneak copies on his company's Xerox machine. Maybe it's time to turn to more legitimate cost-cutting measures.

The **Lubbock Computer Club** (2006-43rd Street, Lubbock, TX 79412) is among those who have taken advantage of lower cost bulk mailing rates. To qualify for bulk, third-class mailing rates, each of your mailings must contain a minimum of either 200 pieces or 50 lbs. If you suspect your group may be big enough to benefit from this, contact your post office for the (extensive) particulars.

High costs or no, the quality of the user group newsletters we see is getting better and better. A new group, the **HUGGERS (Hoosier Users Group)** sent us a copy of their newsletter which sports a very sharp, computer-generated logo. The picture of a figure hugging its console to its breast captures the strong emotions 99'ers have for their machines. One of our editors even thought the pose reminiscent of Botticelli's "Birth of Venus." We all agree, the HUGGERS (P. O. Box 34334, Indianapolis, IN 46234-0334) have come up with an exotic trademark.





No matter how international your logo, the bulk rates we mentioned above don't apply to overseas mail, so you will have to pay for the privilege of exchanging correspondence with the **TI-Users Club in Bergen, Norway**. These Scandinavian cyberphiles write that they are eager to exchange information with other users. As they have a large number of 9- to 14-year-olds in their 300-member group, this would seem like a good source of pen pals for like-minded young TI-enthusiasts. Contact Olav Mjelde, Lungegardsgaten 6, 5000 Bergen, Norway.

And speaking of exchanges, Dr. Kenneth G. Hayden of the **TI-99/4A Users Group in Baltimore** (1111 Park Ave. Suite 303, Baltimore, MD 21201) makes an attractive offer to users groups everywhere. His group is willing to exchange their programs for an equal number of programs from any other users group. To facilitate the exchange process, Dr. Hayden has enclosed a well-organized, 14-page "catalog" of his group's programs (with classifications noted for equipment required, language, etc.). There are five categories: entertainment, education, personal/home management, business, and sound effects. This sounds like the best proposition we've heard in a long time.

And we'd like to proposition you: Send us a message about your users group, an exchange offer, or newsletter, and we'll put your name and information in the hands of TI-users all over the world. Send your letters to the **Users Group Editor, 99'er Home Computer Magazine, 1500 Valley River Drive, Suite 250, Eugene, OR 97401.**

Letters . . . from p. 52

Writing plain English to a disk is simple enough. The following Extended BASIC will write anything you input on the screen to a disk:

```
100 OPEN #1:"DSK1.ENGLISH",DISPLAY
110 LINPUT LINE$
120 IF LINE$="" THEN CLOSE #1 :: STOP
  ELSE PRINT #1:LINE$ :: GOTO 110
```

And the next program will read your text back from the disk file:

```
100 OPEN #1:"DSK1.ENGLISH",DISPLAY
110 IF EOF(1) THEN CLOSE #1 :: STOP
  ELSE LINPUT #1:LINE$ :: PRINT LINE$ ::
  GOTO 110
```

But this is really going about it main strength and awkwardness. If you're seriously interested in printing plain English, what you really want to investigate is a good word processor, of which there are any number on the market. You will find that you will ultimately get much more power and spend far less in time and effort—if not dollars—if you buy one of these word processors.

Say It Again, Sam

Page 4 of the 1983 May issue of the Texas Instruments Home Computer Newsletter states, "The correct procedure for using the SAY subprogram is not explained properly in the Extended BASIC manual." An explanation then follows of the correct procedure.

The following three statements demonstrate the correct procedure for multiple word phrases and illustrate that rather intricate ideas can be expressed using only words and symbols from the manuals limited list of speech words.

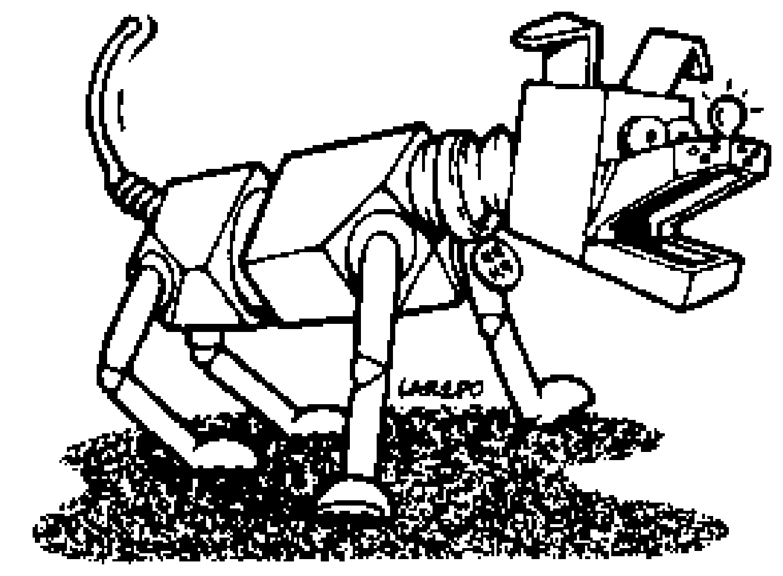
```
100 CALL SAY("THE #TEXAS INSTRU
    MENTS# NINETY NINE FOUR A
    HOME COMPUTER CAN BE A WORK
    ING PARTNER WITH YOU IN BOTH
    WORK AND PLAY")
110 CALL SAY("BE #+# NOT #-# AND
    YOU CAN WRITE A COMPUTER PRO
    GRAM THAT WILL AT THE RIGHT #.#
    PLAY A MESSAGE OF YOUR
    CHOICE.")
120 CALL SAY("ONE POSITIVE POINT IS
    COMPUTER GAMES WILL BE DIF
    FERENT AND MORE COMPLETE IF
    YOU ENTER IN YOUR PROGRAM
    WORDS LIKE #NICE TRY#")
```

I am an older retiree who owns a TI-99/4A strictly as a hobby. I am a novice and have not yet mastered enlarging the Speech Synthesizer's resident vocabulary through adding suffixes and/or the use of the Terminal Emulator II. My enjoyment of this stimulating hobby has been enhanced beyond measure through your magazine.

Robert T. Swahn
Arvada, CO

They're right—the TI Extended BASIC manual doesn't have a full explanation of Speech Synthesizer use. We fleshed out the explanation a bit last month in our Letters column, but we see from your examples that our explanation was not quite complete either. So we've included your program statements to help our other readers better understand the use of the Speech Synthesizer and its resident vocabulary.

July's Choice



Our readers have spoken. The winner of the July B.A.R.C. Back competition is W. K. Balthrop for his history of graphics, "Graphics Grows Up." Our heartiest congratulations and a $100 prize this time go to our own Kelly Balthrop.

Solutions for Problem-solvers

Problem 1 (TI BASIC)

Run time: 7 minutes 41 seconds

```
100 CALL CLEAR
110 FOR X=1000 TO 9999
120 A=INT(X/100)
130 B=X-A*100
140 IF (A+B)*(A+B)<>X THEN 160
150 PRINT X
160 NEXT X
```

Change line 140 as follows and note the run time:

```
140 IF (A+B)  2<>X THEN 160
```

Also, the program with exponentiation is a good program to embarrass some of the other computer dealers with. Every 8 bit computer I have tried that program on will not find all three correct answers. They do find all the answers with the first program.

Problem 1 (Extended BASIC)

Run time: 5 minutes 40 seconds

```
100 CALL CLEAR
110  FOR  X=1000  TO  9999  ::
  A=INT(X/100) :: B=X-A*100 :: IF
  (A+B)*(A+B)=X THEN PRINT X
120 NEXT X
```

Problem 2 (TI BASIC)

```
100 CALL CLEAR
110 FOR X=9 to STEP -2
120 FOR Y=0 TO X-1
130 PRINT TAB(14-X/2+Y);"*";
140 NEXT Y
150 NEXT X
160 GOTO 160
```

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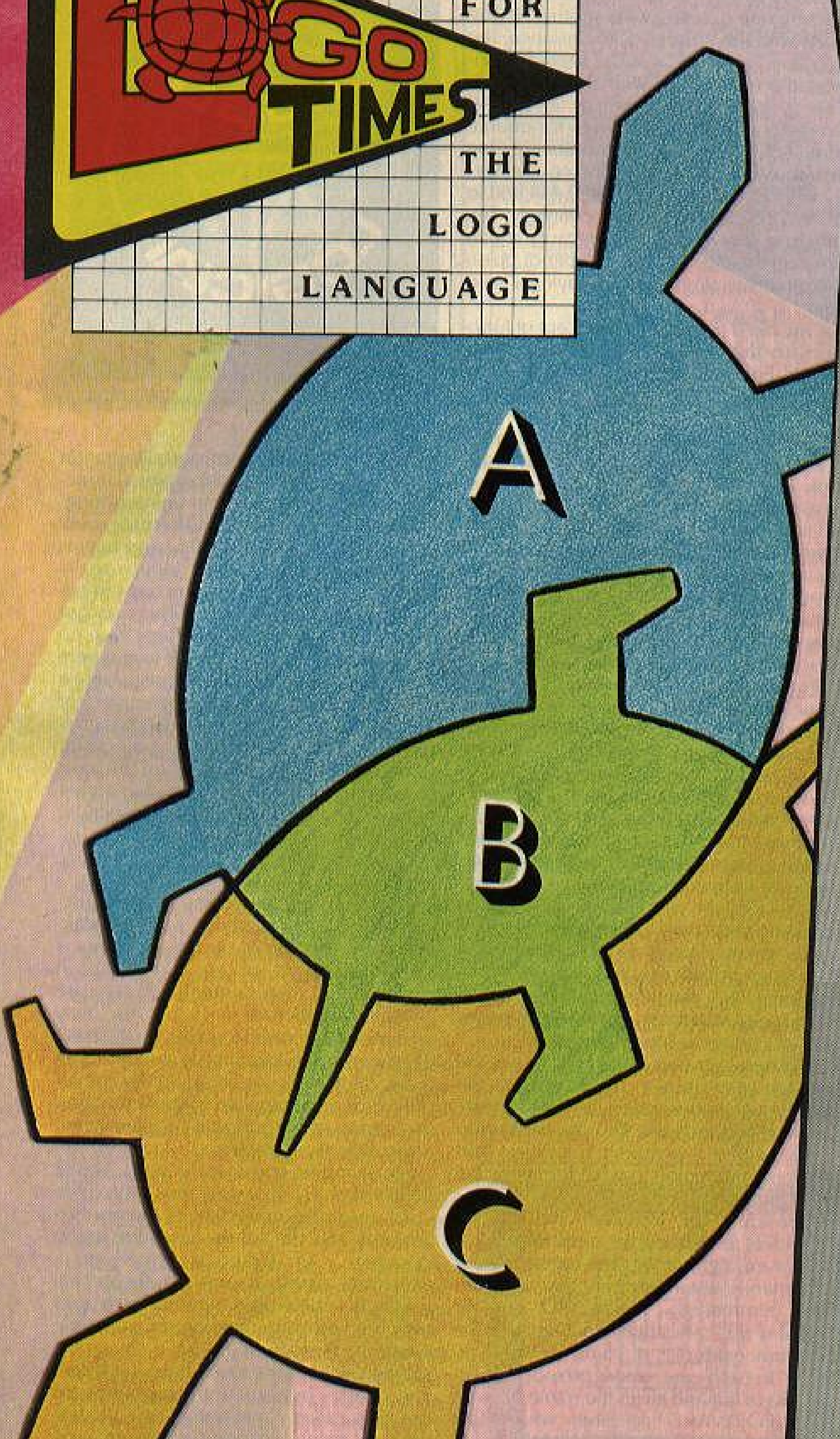

FUNCTIONS, SETS, and TURTLES

By William M. Goodman
Contributing Editor

LOGO'S reputation as an educational tool is well established, and one aspect in particular has attracted wide publicity. LOGO was especially designed to accustom young students to mathematical modes of thinking. Even more importantly, it can help them overcome, or even totally avoid the "mathephobia" that is the bane of so many of their elders. And in an increasingly technological society like ours, children need the help of a tool like LOGO more than ever.

LOGO's potential role in mathematical education is immediately apparent to parents and teachers when they see their first demonstration of it. They are usually taken at once with the elegance of "turtle geometry." When they watch children working with LOGO, they observe how ideas like angles and relative-lengths—which may have been formally presented to the children in their classes—come actively and easily to life in the LOGO context. This is true for virtually all children, regardless of their levels of advancement. But particularly impressive are the cases in which a student has never quite been able to understand geometric concepts. It is not at all unusual to watch such a child *discover* the meaning and usefulness of geometrical notions when called upon to *use* them for drawing with LOGO.

Many people automatically equate the "mathematical" aspects of LOGO with its power to illustrate geometry in a creative and enjoyable way. Certainly, this *is* an important component of the language which does contribute to its educational value. But in my opinion it is *not* turtle geometry that makes LOGO such a valuable combatant of "mathephobia." LOGO also involves the manipulation of sprites and lists. Perhaps sprites and lists do not seem as obviously illustrative of mathematical ideas as turtle geometry, but they can contribute considerably to a child's growing sympathy with "mathematical" ideas. The reason for this is simple: The subtle power of LOGO that helps make a student ready for mathematics does not arise from any one particular application (such as its

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Introduction

LOGO Times is an information resource for anyone interested in participating in the creation of their own *personal* language—one that will easily allow them to communicate with a computer in a totally new audiovisual realm of applied imagination, exploration, and self-discovery. The articles on these pages concern the use of the new TI LOGO language, but readers do *not* need any additional software or equipment (or even a computer) to understand and learn from the material presented here.

If readers want to actually *experience* a TI LOGO environment, they will need either a TI-99/4 or TI-99/4A computer, the Expansion Memory peripheral, and TI LOGO Command Cartridge. A disk drive, although convenient to have, is not required; a user's work may alternately be saved on cassette tape, printed out on the TI Thermal Printer, or hand copied into a notebook (for later re-keyboarding).

In each issue, one or more of the articles may reference or build upon the topics discussed in a previous article. It is therefore recommended that for maximum benefit and understanding, new readers obtain the appropriate back issues of *99'er Home Computer Magazine* containing *LOGO Times* articles.

NOTICE

LOGO Times is actively soliciting articles. Manuscripts should be typed double-spaced, and accompanied by a cassette tape or disk if containing any lengthy procedures or graphics.

Send all materials to:

LOGO Times Editorial Dept.
99'er Home Computer Magazine
1500 Valley River Dr., Suite 250
Eugene, OR 97401

All mail directed to the Letters-to-the-Editor column (*Letters on LOGO*) will be published in accordance with the conditions set forth on *99'er Home Computer Magazine's* Masthead page.

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geometry), but rather from the very *structure* of the language itself.

Functions

One of the central notions of mathematics is the idea of a *function*. A function can be defined as a rule for connecting one quantity with another. If one starts with the number 5, for instance, the function "double," can be used to connect the number 10 with the original 5. This is because one arrives at the 10 precisely by applying the rule for double ("multiply times 2") to the number 5. One could use the same function to connect 22 with 11, 8.24 to 4.12, 9,460,444,460 to 4,730,222,230, and so on, indefinitely. The function is very powerful because it can link together such a vast number of possible quantities simply by employing a fixed rule.

One need not limit the concept of functions to the realm of mathematics textbooks. For instance, the volume of one's radio could be described as a function of the setting of the volume-control dial. Likewise, the temperature of one's oven is a function of where one has set the control. Every time you produce a desired result by deliberately changing some related value or state of affairs, you are presupposing that some *mechanism* is in place—a mechanism which can somehow transform the "input" (such as the dial-setting) to the "output" (such as the actual volume of the radio). In mathematics, the function is such a mechanism.

Functions are a *dynamic* rather than a static notion. Without them, one has only numbers on a page; nothing happens. But with functions, one can start with one set of numbers and transform them into another set. It is just this sense—that functions enable one thing to "follow from" another—that the mathephobe lacks. Anyone who has tried to teach such students knows the frustration of attempting to explain where some formula or answer "came from." Anything one writes on the board is taken as yet another detail to be memorized; it is difficult to get across the idea: "No, don't take all these expressions as separate facts—try to see how they are all *connected* to each other."

It is here, perhaps, that LOGO has the greatest contribution to make in the teaching of mathematics. Its very structure is based on functions. Thus the child who works with it is acquiring a painless and powerful education in what functions are all about.

Consider, for instance, the LOGO primitives for moving the turtle forward or backward, right or left. The form for these commands is standard function notation. The commands "FORWARD 50" or "RIGHT 90", are strictly analogous to the textbook examples of "Sine 60" or "Log 100." In each case, one is provided an input (50 or 60) and given the name of some rule (FORWARD or Sine) which will generate a result on the basis of that input. It's that simple.

Of course, the simplest LOGO primitives, such as FORWARD, have outputs which are physical changes on the screen. This is like our previous illustration of the radio volume-control: Not all functions must output raw (and uninteresting) numbers—turtle-steps will do quite well.

LOGO
LOGICIAN

As one advances in LOGO and begins to design new procedures, one is really setting up new groups of functions in addition to the primitive one. (This may not be so obvious where procedures have no inputs; but it is unmistakably true where inputs are involved.) As students progress with LOGO, they quickly discover for themselves one of the most essential principles of mathematics: If you want something new to "happen" on the basis of given information, you need to invent or uncover a new *mathematical function*, to apply to the given data.

Sets

Closely connected to the idea of functions is the concept of *sets*. Strictly speaking, any collection of objects or numbers can be thought of as a set. But in mathematics, the contents of sets are generally numbers of some sort. Also, they are typically grouped together on the basis of having some bearing on certain functions. They may, for example, be the inputs that will be applied to some function or a group of outputs that resulted when a function was employed.

For example, consider the set [1 34 332 5938 112 3.21]. In theory, this set is quite valid, even if its collection of members is arbitrary and the values have nothing in common. In practice, however—excepting cases of abstract theoretical research—one would mention such a set only if it had some bearing on a possible function. Perhaps they are a set of the calorie-values of the food I have just eaten, and I wish—by using the straightforward function called "addition"—to calculate my total caloric intake. Or they may be data which have been read from dials and which are to be synthesized later, using statistical functions. In any case, sets, like functions, do not exist as isolated facts to

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be simply memorized; rather, they invite one to discover the functions which unite them.

As with the case of functions, LOGO is able to familiarize its users with the concept of sets. Again, it does this by the very structure it employs. In LOGO, data is stored in *lists*—and these lists are actually *sets* of data. The relation between sets and functions is made obvious: Lists (or sets) are established by performing certain procedures (or functions). And in turn, one can use these lists (sets) as inputs to other procedures (functions). For children who work extensively with LOGO, the transformations between numbers and formulas and the workings of sets and functions become everyday matters of experience.

Following are some LOGO procedures designed to illustrate the concepts described above. Of course, from what has been said, it would follow that *any* LOGO procedure is an example of a function/set relation. But the following cases are explicitly tailored to demonstrate these ideas.

Turtle Cases

As we already pointed out, the built-in turtle primitives follow a function/set notation. Whether FORWARD 50 or SET COLOR 8 is chosen, the form is the same: A set of data is accepted as input ([50] or [8]) and by executing the function which is named (FORWARD or SETCOLOR), LOGO produces an output (movement or change-of-color).

Just as functions can be combined in mathematics, they can be used together in LOGO. Consider the procedures named LEFTMOVE and RIGHTMOVE. (These procedures also bear shorter names, LM or RM.) Each procedure or function takes *two values* as its input.The two values together can be viewed as its input set. The first value will determine how far to turn left (or right), while the second tells how far to move forward in that new direction. For instance, LM 45 100 causes the turtle to turn left 45 degrees and then proceed forward 100 steps. (Before you run one of these LOGO procedures, type SHOWTURTLE—or ST—to put the turtle on the screen.)

This can be compared to a mathematical function such as Tangent (20 + 30), if one thinks of the "+" as part of the overall function. Thus, the TANGENT (+) function, like the LEFTMOVE function, proceeds in two steps. In this case it begins by adding the numbers in the input set; then it takes the tangent of this sum.

The LOGO procedure, DESIGN1, demonstrates that the number of "steps" a function sets in motion is by no means limited to the number of elements in its input set. Rather, the function itself determines how these inputs will be used.

DESIGN1 is a version of the now-famous spiral-type program for turtle geometry. The set consists of three numbers, representing, respectively (1) the length of the first side to be drawn, (2) the angle to turn once the side is drawn, and (3) the amount by which to increase the value of (1) for the next pass. The function itself is recursive and therefore unending. After each pass, it updates the value for the side, and starts again. Figure 1, for example, shows the result of commanding DESIGN1 10 90 5. (Were it not for the turtle's "run-

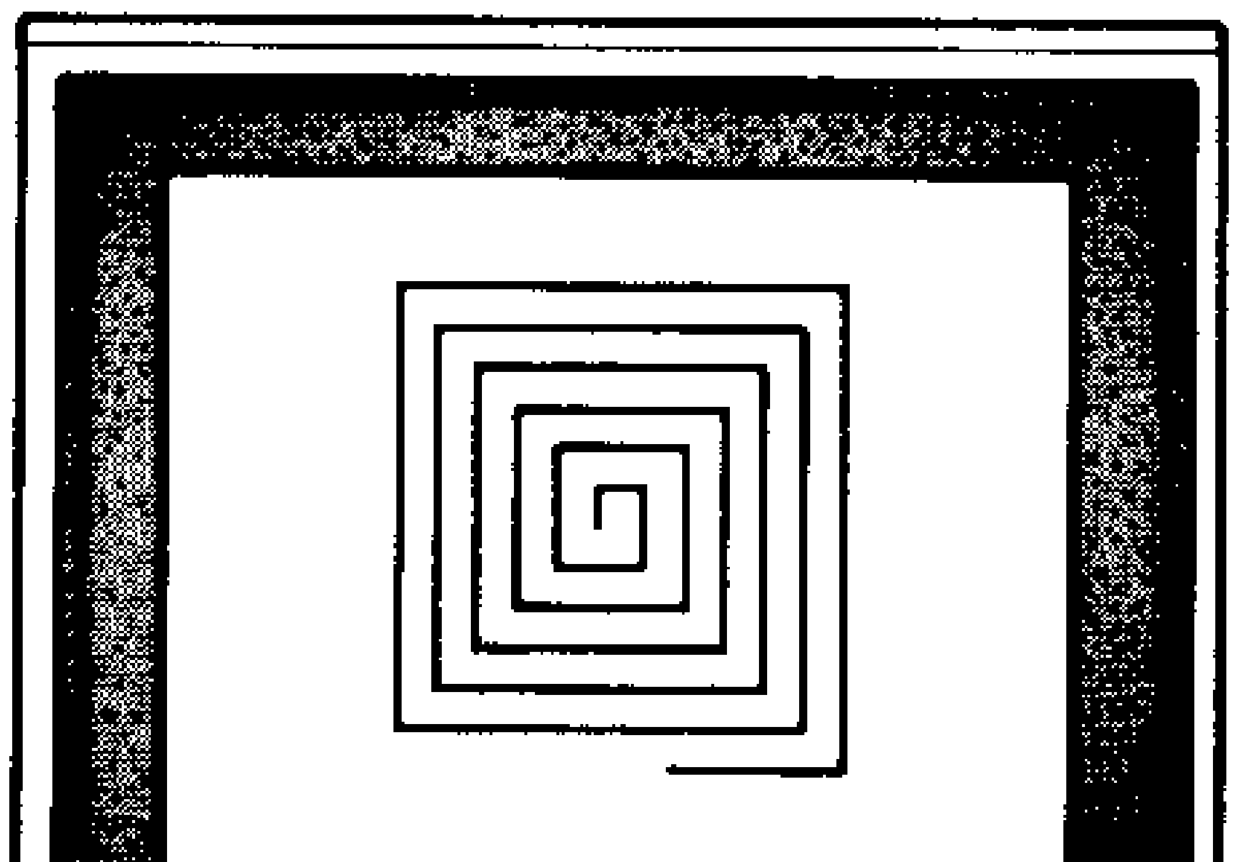

Figure 1: **Output for the Function, DESIGN1 10 90 5. (Output ceases only because the turtle runs "Out of Ink".)**

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ning out of ink," the figure would expand indefinitely and eventually fill the screen. When the turtle does run "out of ink," type CLEAR SCREEN—or CS—to "refill" it.) Note how all the angles are 90 degrees; and how each new side is 5 units longer than the last side drawn.

The point of all this is to show that functions can do almost *anything* on the basis of their inputs. It all depends on the imagination of the function's designer's. Suppose, for instance, that one likes the shapes that DESIGN1 can produce but wants to limit the number of repetitions allowed. This can be accomplished by a procedure such as DESIGN2.

Interestingly enough, DESIGN2 is a function which requires *more* information in its input set than does DESIGN1. Yet the intended result of this is precisely to *limit*, rather than expand upon, the output of the function. The first three entries in the DESIGN2 input set correspond exactly to the three inputs for DESIGN1. But DESIGN2 requires a fourth input whose value determines the number of repetitions allowed for the recursion. This can be seen in Figure 2, which shows the results of running DESIGN2 10 90 5 15. The shape is the same as for Figure 1, since the first three inputs are also identical. However, on the basis of the fourth input (15), only fifteen "sides" are drawn.

The two procedures, FIGURE and FIGURE2, are included to graphically illustrate the close relationship between functions and sets. They show how input sets which are seemingly very *dissimilar* can produce results which are the same. It all depends on the function that is used to process these data.

FIGURE is a procedure which requires an input set of the following sort: The first entry represents the number of "sides" which are to be drawn. The number of remaining members in the input set depends upon the number of sides selected in that first entry. For each additional side to be drawn, a pair of values must be given: one value for its length and another for the angle of the turn to be made once the side is drawn. So if the first entry says there are 15 sides, then the input should include 15 additional pairs of numbers to give the values for each new side and angle. The input values follow the procedure call inside square brackets, separated by spaces: FIGURE [2,20,90,20,90], for instance. FIGURE2 includes an application of the FIGURE procedure that would draw the very same picture as produced by DESIGN2.

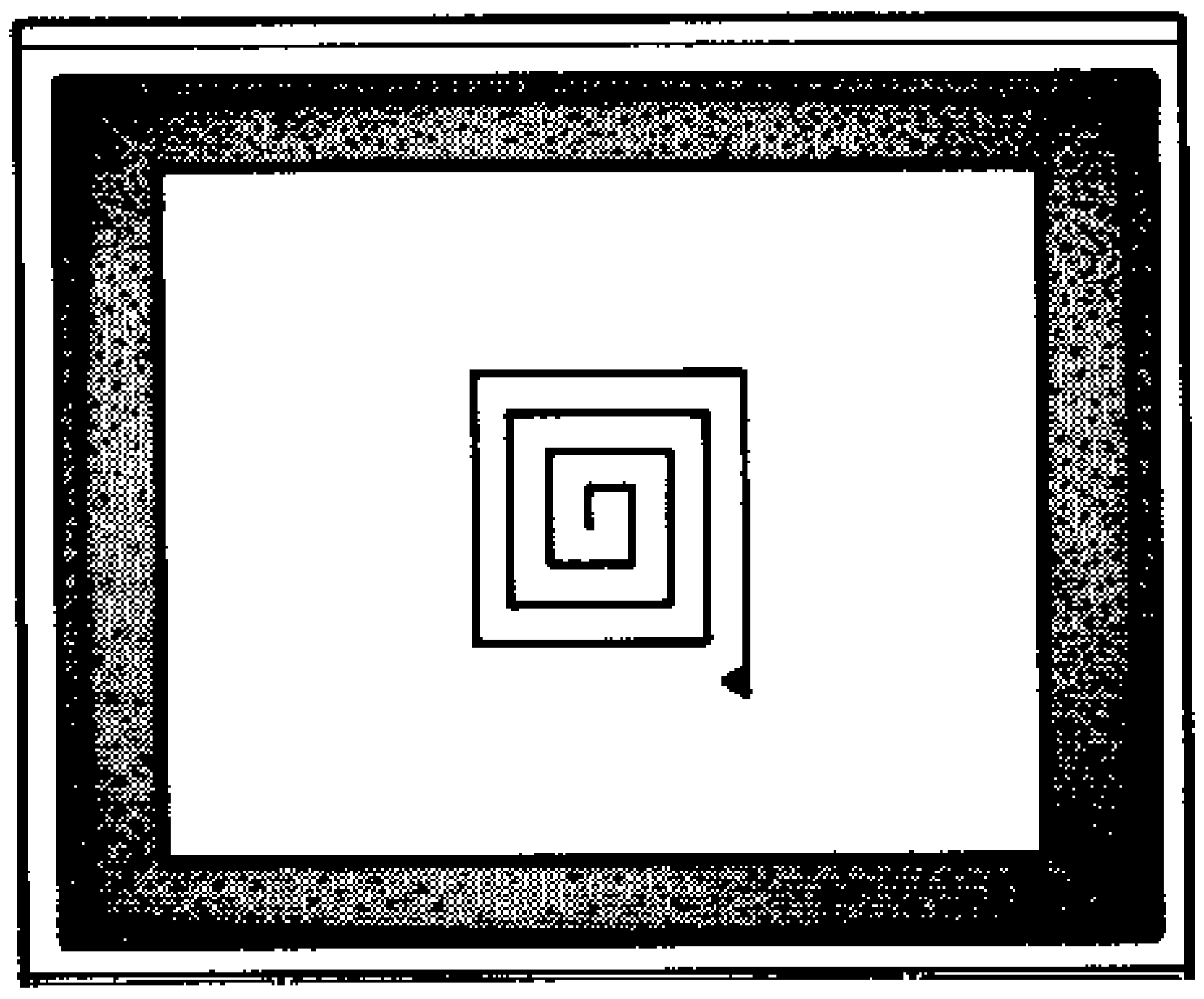

Figure 2: Output for the Function, DESIGN2 10 90 5 15. This is also the output for... FIGURE [15 10 90 15 90 20 90 25 90 30 90 35 90 40 45 90 50 90 55 90 60 65 90 70 90 75 90 80 90] Also, the above figure can be the output for... FIGURE2 [15 90 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80]

The FIGURE routine is actually quite powerful; unlike DESIGN2, it allows one to change the angles as well as the lengths of sides. But if one has no intention of varying the angles, it is also rather clumsy. FIGURE2 is a procedure which, like DESIGN2, keeps the angles constant throughout the routine.

The input set for FIGURE2 is of this sort: The first value represents the number of sides to be drawn. The second entry tells the angle to be turned after each side is drawn. The remaining entries simply enumerate, one by one, the values of the subsequent sides. In Figure 2 we see a use of the FIGURE2 function, which will reproduce the shape originally produced by DESIGN2.

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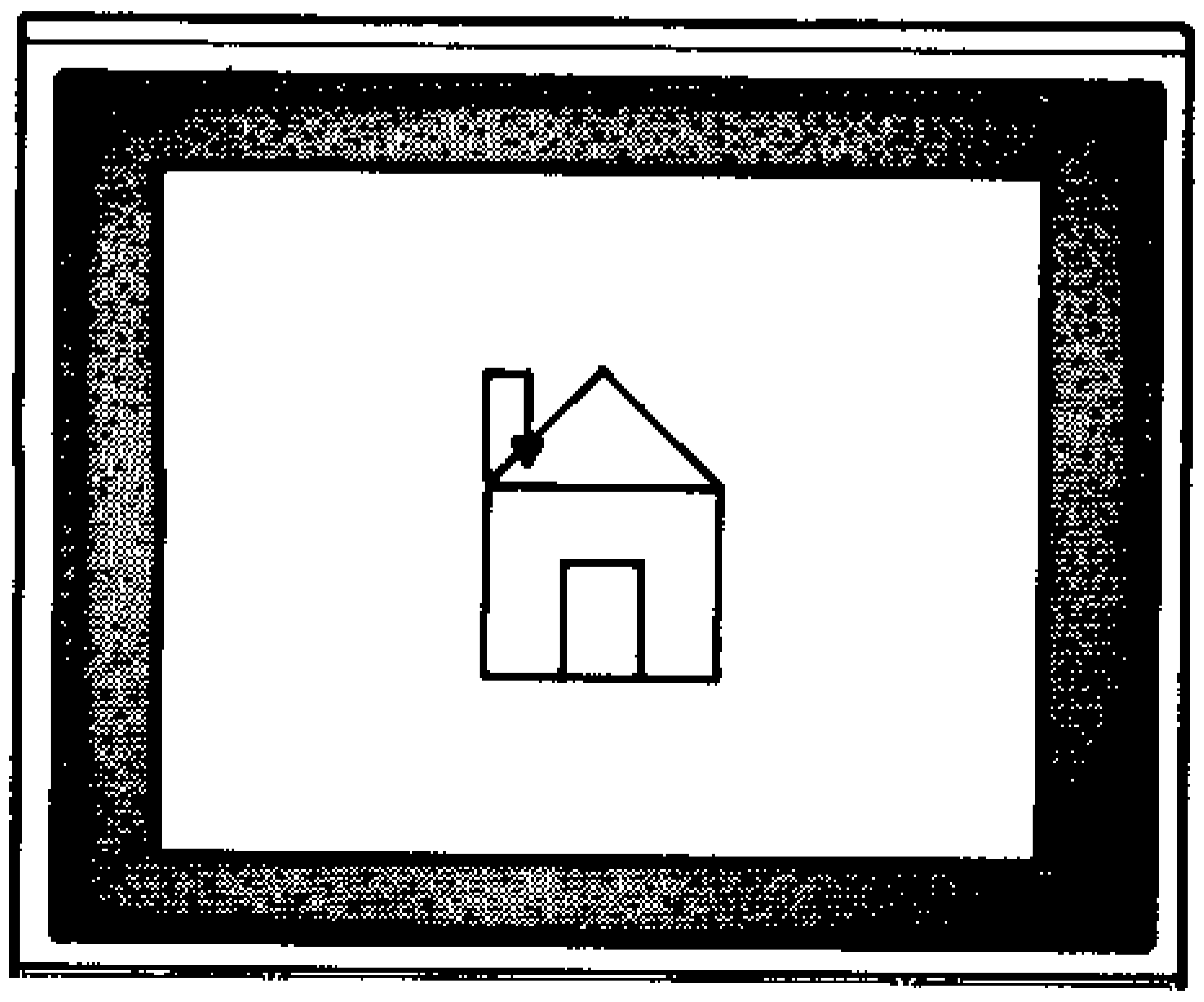

Figure 3: **House. This figure can be output using either HOUSE1 (which is a traditional sequence of FORWARD'S and RIGHT's), or HOUSE2 (which is based on the function named FIGURE).**

Just for fun, this turtle section closes with two additional routines. The first, called HOUSE1, draws a house by the normal sequence of FORWARD and RIGHT commands. HOUSE2 draws the identical picture, using instead the FIGURE procedure. The results are shown in Figure 3.

Non-Turtle Procedures

The remaining procedures show that in LOGO the function-orientation need not be restricted to the realm of numbers. For example, the function FATHER.OF requires as input the name of some person; its output is the name of that person's father. In short form, one can type, for instance, PRFO"LITTLE.JOE—which stands for "print the FATHER.OF Little Joe"—to get the response, BEN.CARTWRIGHT.

Even the sub-procedures that make the FATHER.OF routine possible are constructed in a functional form. LISTPLACE, for example, takes as input a list of names or other elements, plus the name of some particular element. The output of this function is the place number in the list of that particular element. If the element is not in the list, a zero is returned.

Another sub-procedure is called FINDEL. Its input set includes a number

Figure 4: **Father.of. The text below shows an example session, using the non-turtle procedures described in this article.**

```
?NAMESINIT
?PRFO "LITTLE.JOE
THE FATHER OF LITTLE.JOE IS. . .
BEN.CARTWRIGHT
?PRFO "JANE.FONDA
THE FATHER OF JANE.FONDA IS. . .
HENRY.FONDA
?PRFO "PEBBLES
THE FATHER OF PEBBLES IS. . .
FRED.FLINTSTONE
?PRFO "ME
THE FATHER OF ME IS. . .
W A R N I N G ! NAME IS
UNFAMILIAR TO ME!
NAME.NOT.RECORDED
?ADDCHILDREN&FATHERS
WHO IS THE CHILD?ME
WHO IS THE FATHER?MY.FATHER
WHO IS THE CHILD?SON.OF.
FRANKENSTEIN
WHO IS THE FATHER?FRANKEN
STEIN.SR.
WHO IS THE CHILD?DONE
?PRFO "SON.OF.FRANKENSTEIN
THE FATHER OF SON.OF.FRANKENS
TEIN IS. . .
FRANKENSTEIN.SR
?PRFO "ME
THE FATHER OF ME IS. . .
MY.FATHER
**********************************

?PRINT FINDEL 4 [PETER PAUL
MARY SUE JAMES]
SUE
?PRINT LISTPLACE [PETER PAUL
MARY SUE JAMES] "SUE
4
?PRINT LISTPLACE [PETER PAUL
MARY SUE JAMES] "PAUL
2
?PRINT LISTPLACE [PETER PAUL
MARY SUE JAMES] "FRANK
0
```

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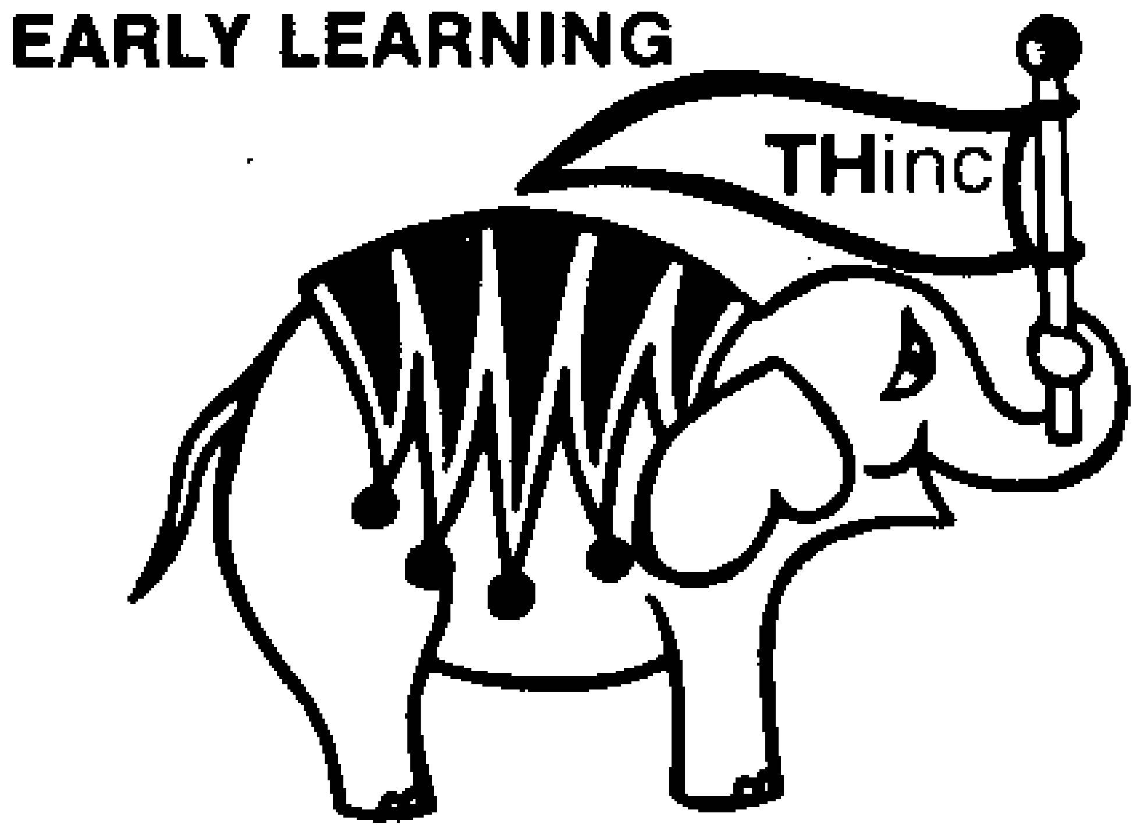

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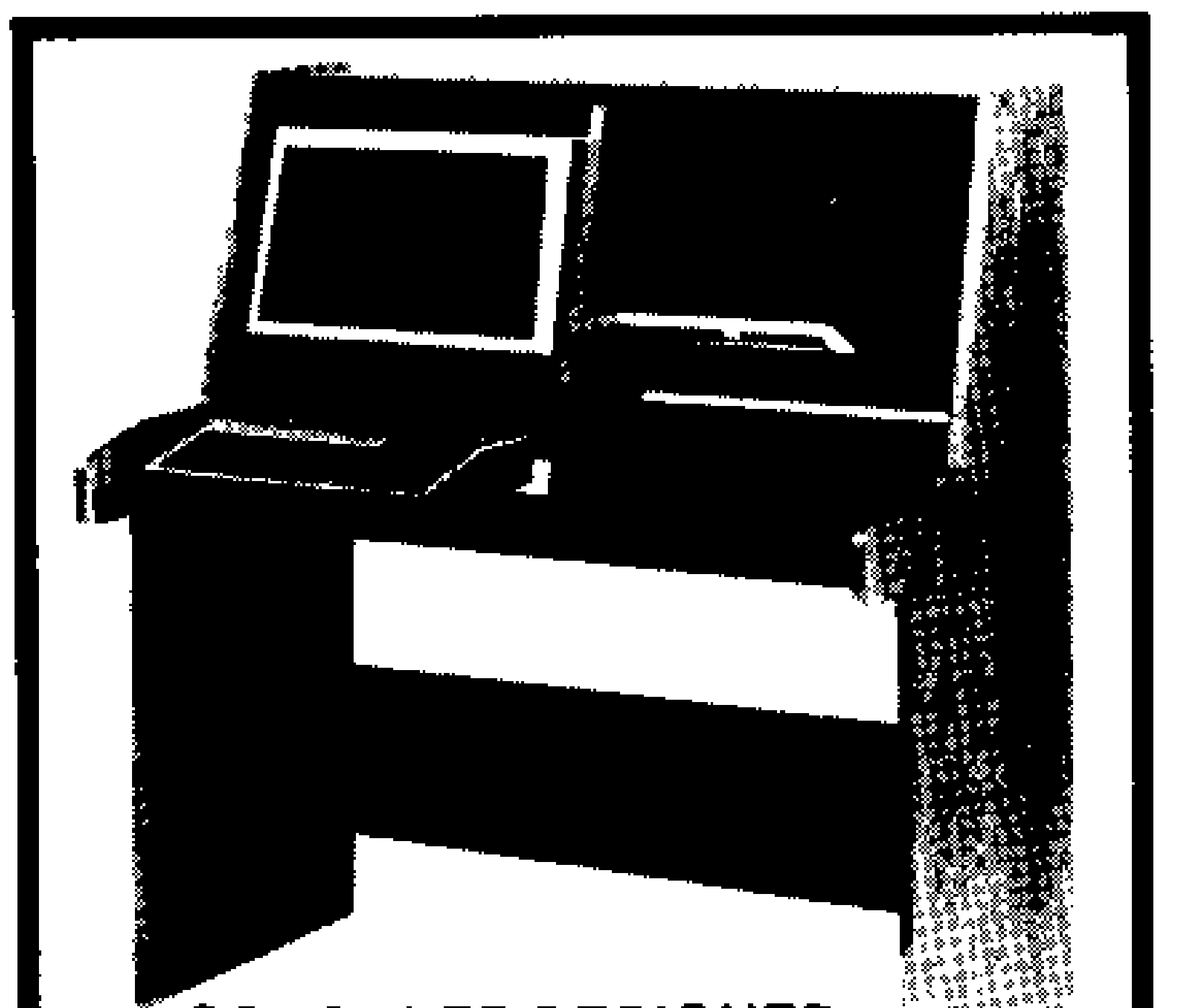

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and a list of elements. If the number is 4 for example, then FINDEL 4 [JOE JANE SMITH ROB FRED] will return the 4th element of the list—in this case, ROB.

For the FATHER.OF routine to work, of course, the computer must have in memory a set of FATHERS and a corresponding set of CHILDREN. The procedure NAMESINIT can be run simply to enter such a pair of sets into memory. Use of the procedure ADDCHILDREN& FATHERS allows one to add any additional pairs one desires. If one tries to employ the function FATHER.OF when the child in question is not known to the computer, a warning is given. A sample session using these functions is shown in Figure 4.

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The number of variations possible is, of course, endless. Anything you could do with LOGO will be a further illustration of functions and sets in action. The purpose of this article is to encourage you to look at whatever you do with LOGO in light of this perspective. Then, when a particular result is wanted, you need only ask: What input set and what function could make this outcome happen? When this is known, the procedure is half-way written.

Non-Turtle Procedures

```
TO ADDCHILDREN&FATHERS
;  ADDS TO LISTS OF CHILDREN AN
D FATHERS, AS PER INPUTS
;  ADDS TO END OF LISTS
PRINT [ ]
TYPE [WHO IS THE CHILD? ]
MAKE "S READLINE
IF :S = [DONE ] THEN STOP
MAKE "CHILDREN SE :CHILDREN :S
PRINT [ ]
TYPE [WHO IS THE FATHER? ]
MAKE "F READLINE
MAKE "FATHERS SE :FATHERS :F
ADDCHILDREN&FATHERS
END
```

```
TO PRFO CHILD
;  PRINTS THE NAME OF THE
;  CHILD'S FATHER
PRINT [ ]
MAKE "S SE [THE FATHER OF ] SE
  :CHILD "IS...
PRINT :S
PRINT FATHER.OF :CHILD
PRINT [ ]
END

TO CHILDSPLACE CHILD
;  FIND THE PLACE OF THIS CHILD
  IN LIST OF ALL KNOWN CHILDREN
OUTPUT LISTPLACE :CHILDREN :CH
ILD
END

TO FATHER.OF CHILD
;  RETURNS THE FATHER OF THE GI
VEN CHILD
MAKE "CHILD.I.D. CHILDSPLACE :
CHILD
IF :CHILD.I.D. = 0 THEN OUTPUT
  NOT.THERE
OUTPUT FINDEL :CHILD.I.D. :FAT
HERS
END

TO NAMESINIT
;  SETS UP DATA LISTS, AS REQUI
RED FOR THE FATHER - OF FUNCTI
ON
MAKE "CHILDREN [LITTLE.JOE JAN
E.FONDA CAROLINE.KENNEDY PEBBL
ES ]
MAKE "FATHERS [BEN.CARTWRIGHT
HENRY.FONDA JFK FRED.FLINTSTON
E ]
END

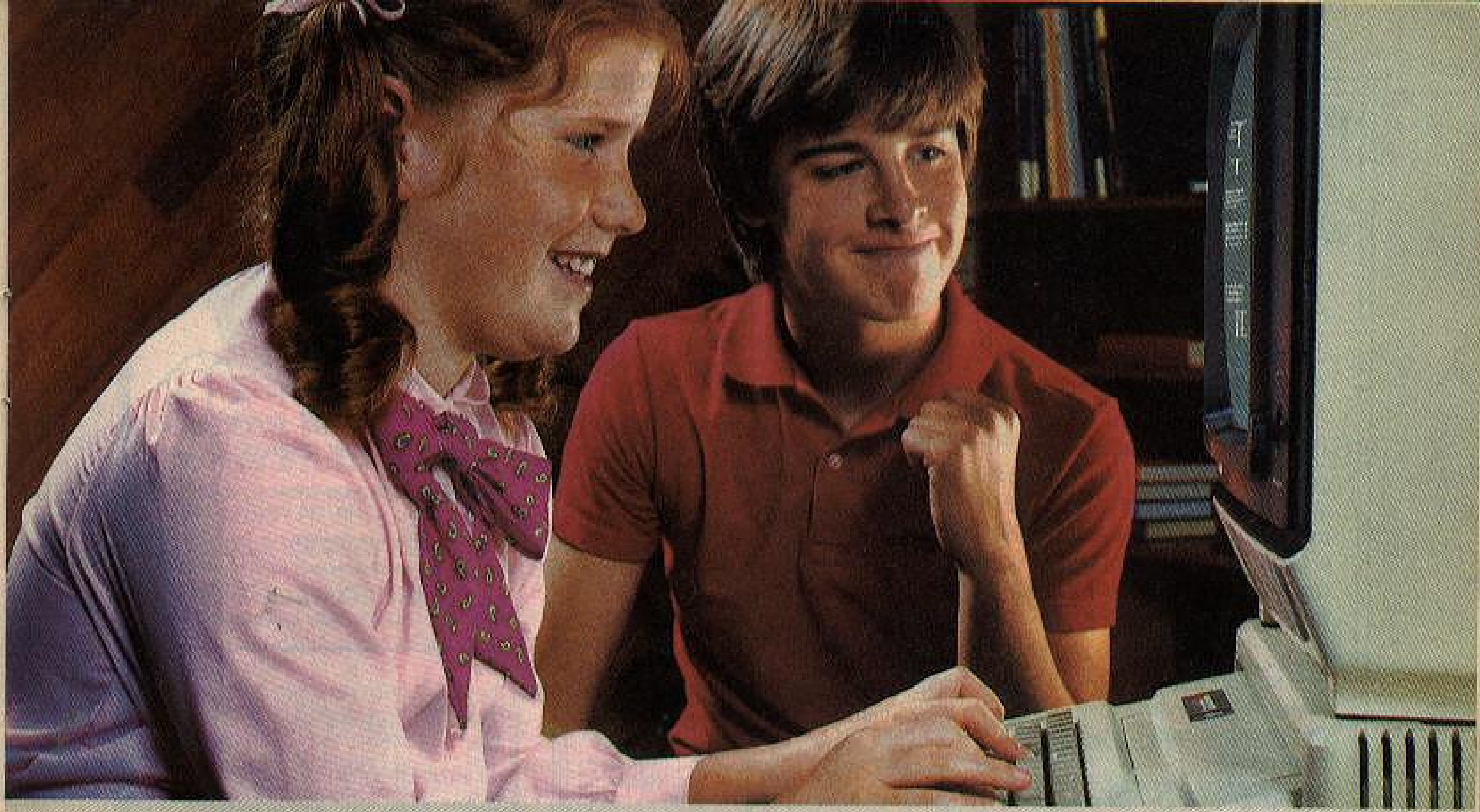
TO NOT.THERE
;  ROUTINE TO RECOVER WHEN AN E
LEMENT NOT FOUND IN A LIST
PRINT [ ]
PRINT [W A R N I N G ! NAME IS
  UNFAMILIAR TO ME! ] PRINT [ ]
OUTPUT "NAME.NOT.RECORDED
END

TO P FILE
PRINT :FILE
END

TO E FILE
;  TO ERASE A FILE
RUN SE "ERASE :FILE
END

TO FINDEL ELNO LIST
;  RETURNS ELEMENT NO. ELNO OF
THE LIST
REPEAT :ELNO [MAKE "WANTED FIR
ST :LIST MAKE "LIST BF :LIST ]
OUTPUT :WANTED
END
```

Continued on p. 62



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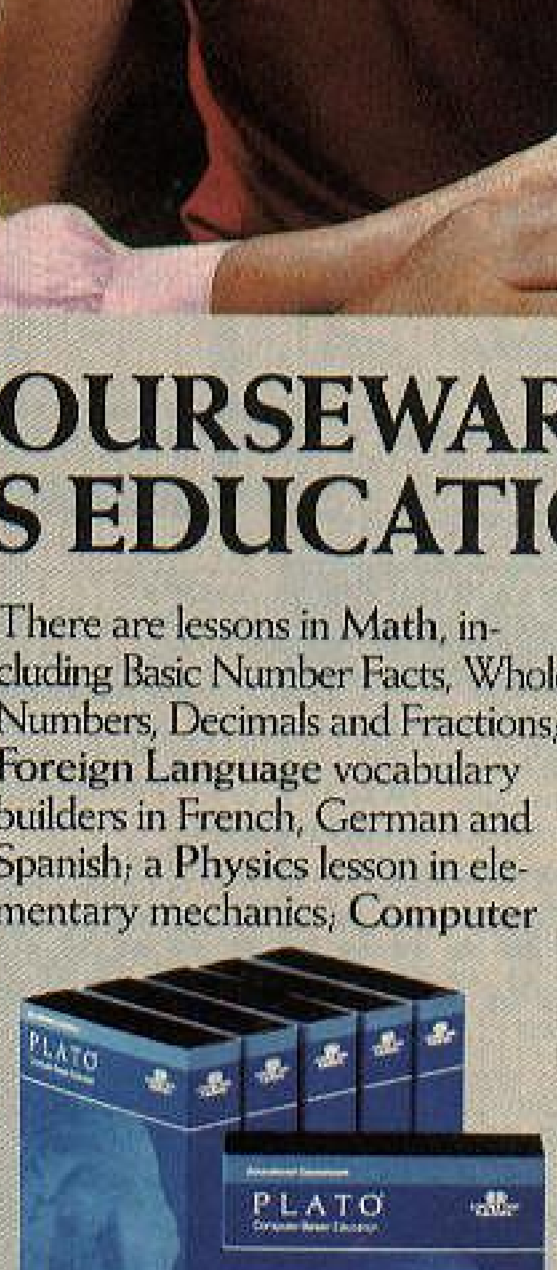

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Turtles . . . from p. 60

```
TO LISTPLACE1 LIST ELEMENT ELN
O
; MAINLOOP FOR LISTPLACE
MAKE "ELNO :ELNO + 1
TEST FIRST :LIST = :ELEMENT
IFT OUTPUT :ELNO
IFF
TEST BF :LIST = [ ]
IFT OUTPUT 0
; I.E. IF ELEMENT NOT FOUND IN
 LIST, THEN 0 IS RETURNED AS A
 WARNING FLAG
IFF OUTPUT LISTPLACE1 BF :LIST
 :ELEMENT :ELNO
END

TO LISTPLACE LIST ELEMENT
; RETURNS THE PLACE NUMBER OF
THE ELEMENT IN THE LIST
MAKE "ELNO 0
OUTPUT LISTPLACE1 :LIST :ELEME
NT :ELNO
END
```

Turtle Cases

```
TO HOUSE2
CS
FIGURE [15 30 90 20 90 30 90 4
0 90 50 90 60 90 50 90 60 90 5
0 45 42 90 42 135 60 90 30 90
10 90 20 0 ]
END

TO HOUSE1
CS
FD 30 RT 90 FD 20 RT 90
FD 30 RT 90 FD 40 RT 90
FD 50 RT 90 FD 60 RT 90
FD 50 RT 90 FD 60 RT 90
FD 50 RT 45 FD 42 RT 90
FD 42 RT 135 FD 60 RT 90
FD 30 RT 90 FD 10 RT 90
FD 20 RT 0
END

TO RIGHTMOVE RIGHTAMOUNT FWDAM
OUNT
RT :RIGHTAMOUNT
FD :FWDAMOUNT
END

TO LM ANGLE AMOUNT
LEFTMOVE :ANGLE :AMOUNT
END

TO LEFTMOVE LEFTAMOUNT FWDAMOU
NT
LT :LEFTAMOUNT
FD :FWDAMOUNT
END

TO RM ANGLE AMOUNT
RIGHTMOVE :ANGLE :AMOUNT
END

TO SQUARE
REPEAT 4 [RM 90 100 ]
END

TO FIGURE ATTRIBUTES
MAKE "COUNT FIRST :ATTRIBUTES
MAKE "ATTR BF :ATTRIBUTES
REPEAT :COUNT [DATA FR :FWD :A
NG ]
END

TO DATA
MAKE "FWD FIRST :ATTR
MAKE "ANG FIRST BF :ATTR
MAKE "ATTR BF BF :ATTR
END

TO DESIGN2 SIDE ANGLE INCREMEN
T REPETITIONS
FD :SIDE
RT :ANGLE
MAKE "REPETITIONS :REPETITIONS
 - 1
TEST :REPETITIONS = 0
IFF DESIGN2 :SIDE + :INCREMENT
 :ANGLE :INCREMENT :REPETITION
S
END

TO DESIGN1 SIDE ANGLE INCREMEN
T
FD :SIDE
RT :ANGLE
DESIGN1 :SIDE + :INCREMENT :AN
GLE :INCREMENT
END

TO FORWARDRIGHT FWD ANGLE
FD :FWD
RT :ANGLE
END

TO FR FWD ANGLE
FORWARDRIGHT :FWD :ANGLE
END

TO FIGURE2 SIDEATTRIBUTES
MAKE "COUNT FIRST :SIDEATTRIBU
TES
MAKE "ANG FIRST BF :SIDEATTRIB
UTES
MAKE "SIDEATTR BF BF :SIDEATTR
IBUTES
REPEAT :COUNT [DATA2 FR :FWD :
ANG ]
END

TO DATA2
MAKE "FWD FIRST :SIDEATTR
MAKE "SIDEATTR BF :SIDEATTR
END
```

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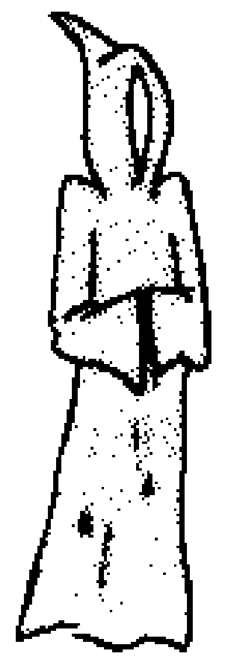

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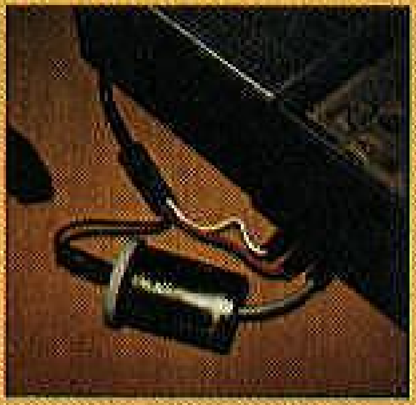

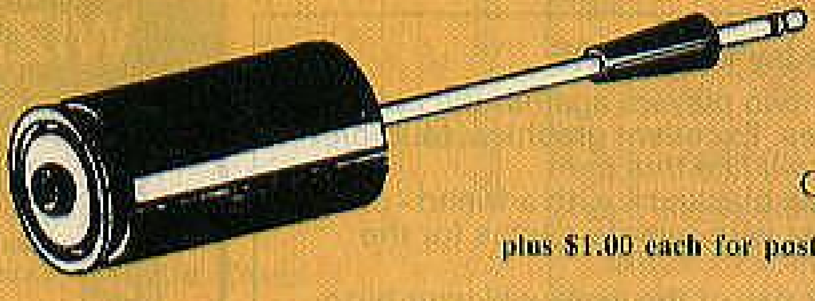

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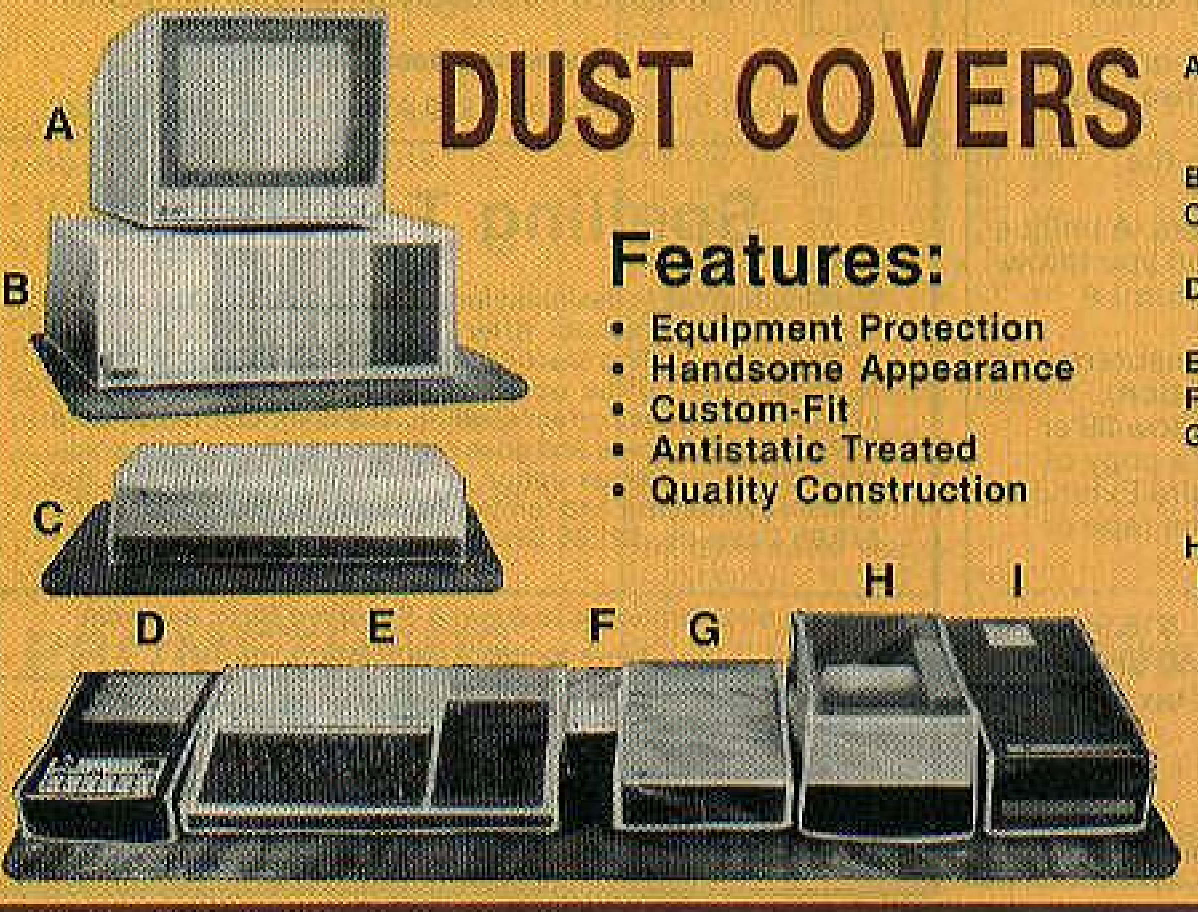

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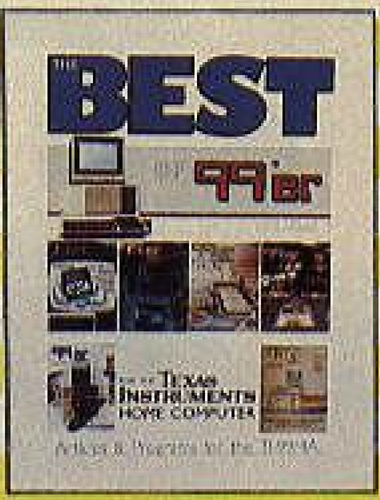

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This giant compendium of material drawn from the first publication year of *99'er Magazine* (original name) contains nearly 400 magazine-size pages chock full of valuable tips, tutorials, applications and "How-To" articles, plus 75 type-in-and-RUN computer programs in four languages (BASIC, Extended BASIC, LOGO, and Assembly) for the TI-99/4A Home Computer. The information, programming and attractive artwork contained within this first compendium have been completely revised and updated from the material as originally published. The collection also contains some new material never before published. This mammoth reference work is organized into eight comprehensive chapters—the first dealing with "Starting Out"; the next four with languages and programming; and the remaining three covering computer-assisted instruction, game-playing, plus applications and utilities. $19.95

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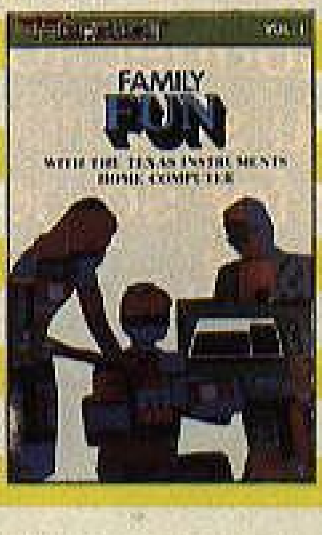

This newly-revised and updated selection of material drawn from the first two years of *99'er Home Computer Magazine* introduces families to the myriad of entertainment possibilities with their Texas Instruments 99/4A Home Computers. Fresh artwork and careful organization of the material make computer literacy both fun and easily attainable for family members of all ages. Neophytes will learn how to program sound effects and graphics and design their own games. Additionally, there are six complete game programs ready to be typed in and played. A unique "Programmer's Guide" appendix transforms this volume into a powerful learning tool for those who desire to go deeper into various aspects of programming.

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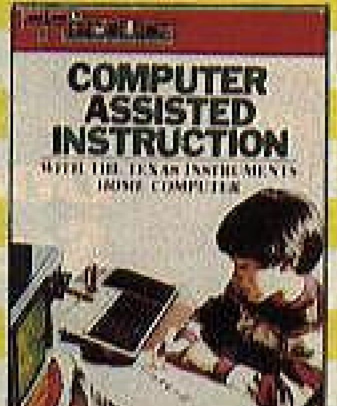

99'er GUIDE
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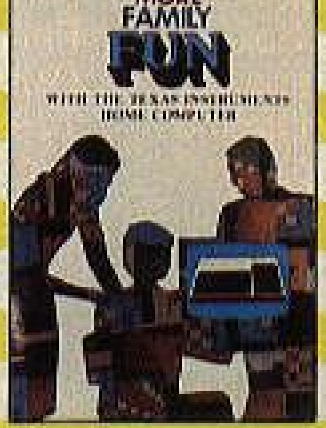

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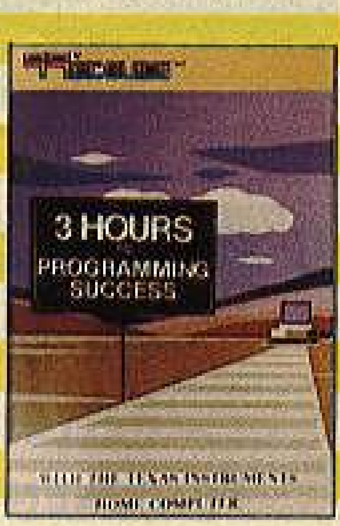

This book is the cure for "cyberphobia" (the fear of computers and computer-related activities) in new owners of the Texas Instruments Home Computer. After using "canned" software in the form of video game modules, home financial packages, and educational programs, most people become curious about computer programming. They want to know how to make screen graphics, generate computer music, and produce special color effects. When they try on their own, they often have problems with BASIC communications. This friendly, 99'er-Guide™ sweeps away the mystery and quickly shows new TI owners of all ages how to get single programs up and RUNing as fast as possible. After completing this entertaining 3-hour course, the reader will be pleasantly surprised to find that the computer has become a friend as well as a useful tool. Complete with comprehensive glossary, reference charts, and attractive illustrations throughout.

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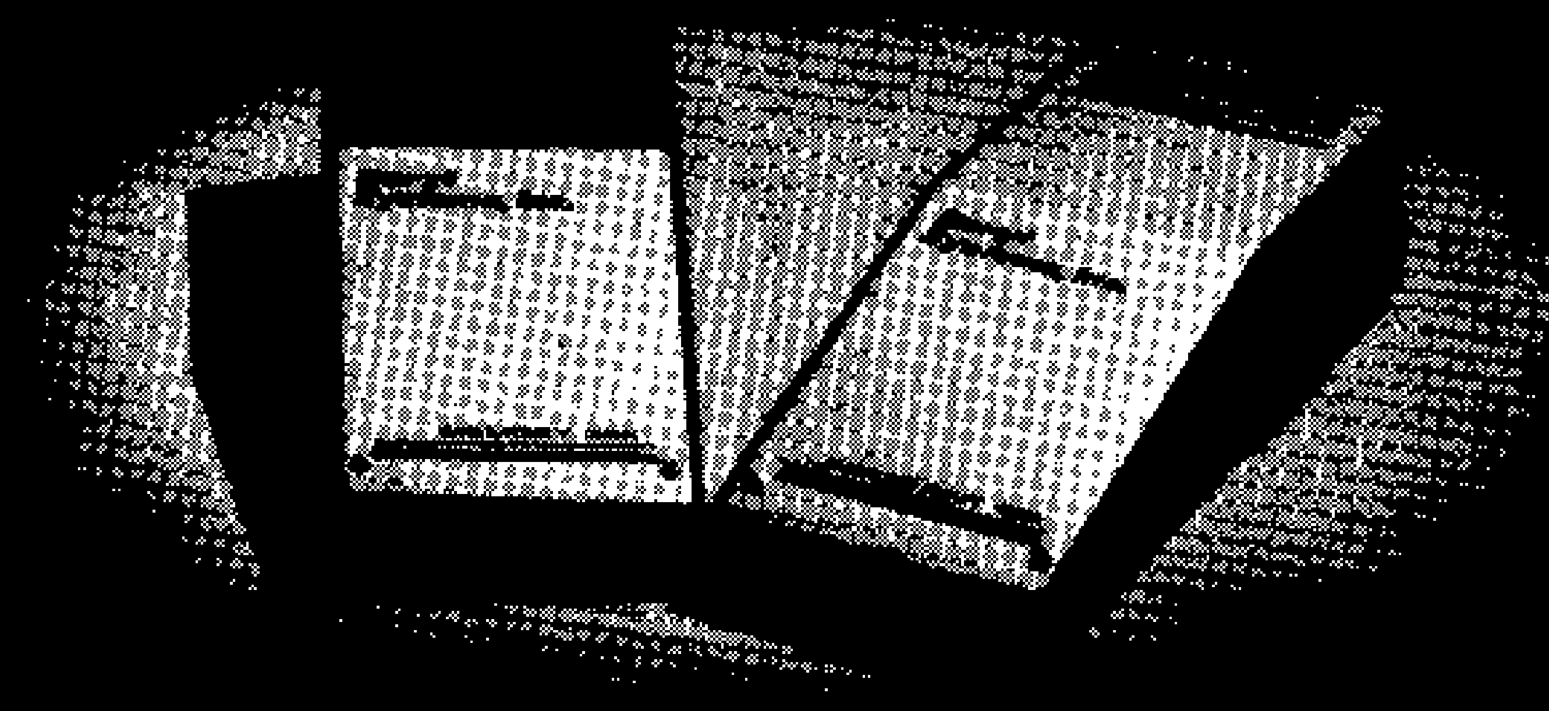

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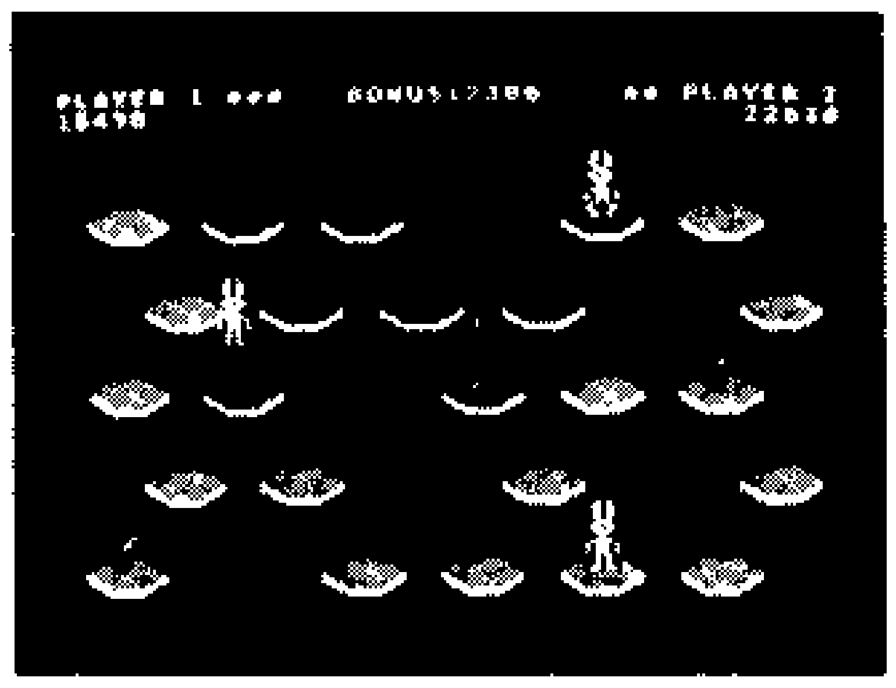

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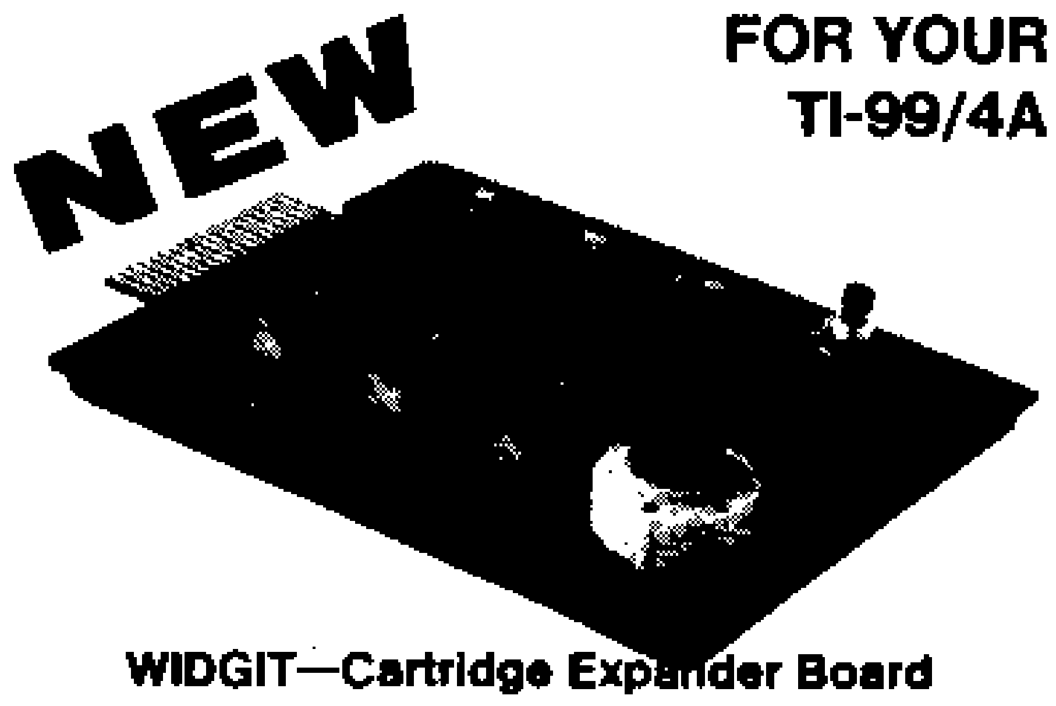

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This program requires EDITOR ASSEMBLER, 32K memory expansion and a Disk drive.

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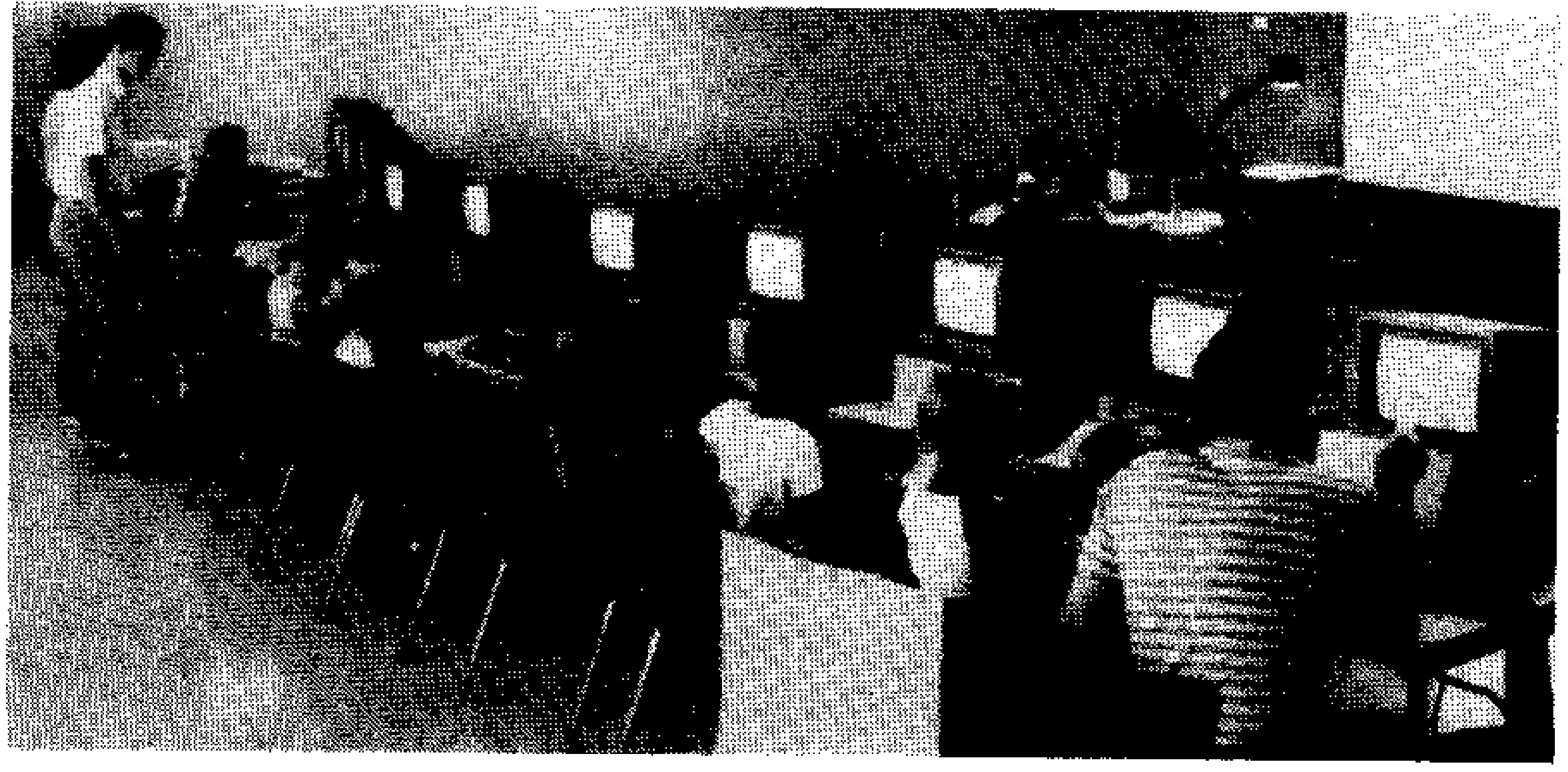

Potpourri

Dear Editor,

I am enclosing some photographs taken at a Computer Camp recently held in our city. While this may not be an unusual event in areas in or near large urban centers, Alamogordo, New Mexico (pop. ca. 30,000) is not large and is located at a considerable distance from any large city. It is the site of the International Space Hall of Fame (ISHF), a space museum which also boasts a planetarium. The camp was sponsored and held at ISHF.

I am the owner of a TI-99/4A and I wanted my son (who just finished kindergarten) to gain some experience with Logo before we aquire Logo II. The children in the photographs are kindergarten through second grade and for most this was their first computer experience. The emphasis was on Logo (there were other classes on BASIC for older children) and within two weeks the children were able to load disks by themselves and select and run interactive Logo programs.

It was also gratifying to me to see so many TI-99's in use so near. Like many of your readers who write, I was beginning to think that I had the only TI-99 within 100 miles. The computers in use in the camp were donated by Texas Instruments to New Mexico State University. During the school year they tour the state in a van to give children around the state a computer experience.

Finally, I must congratulate you on your magazine. I have found it to be very helpful in aiding me to make use of my machine. The business, technical, and utilities programs have been valuable to me and my family. My wife has put away her electric typewriter in favor of this (TEX-SCRIBE) and, of course, my son enjoys the games.

Keep it up!

Sincerely Yours

Travis B. Griffin, Ph. D
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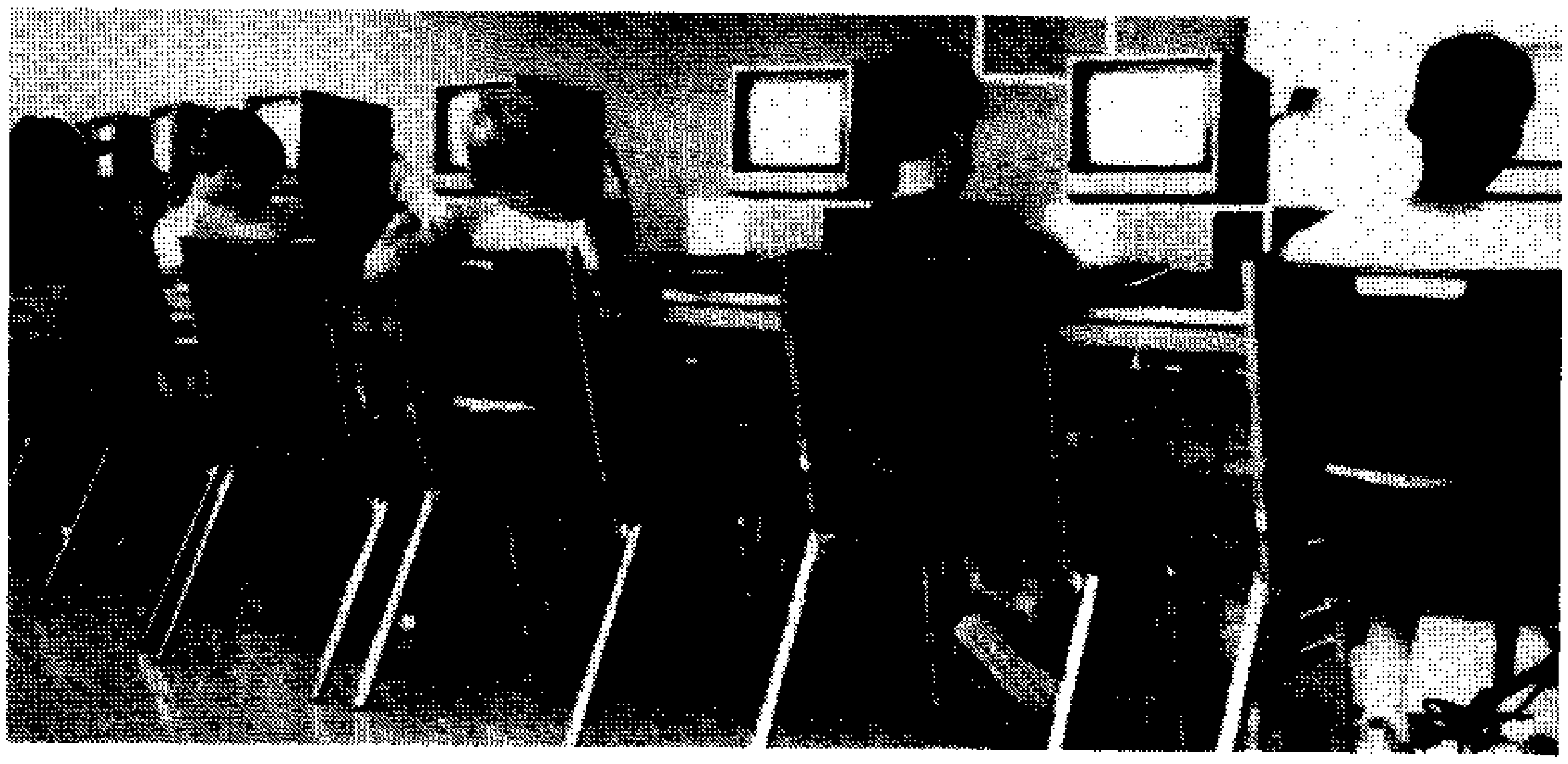

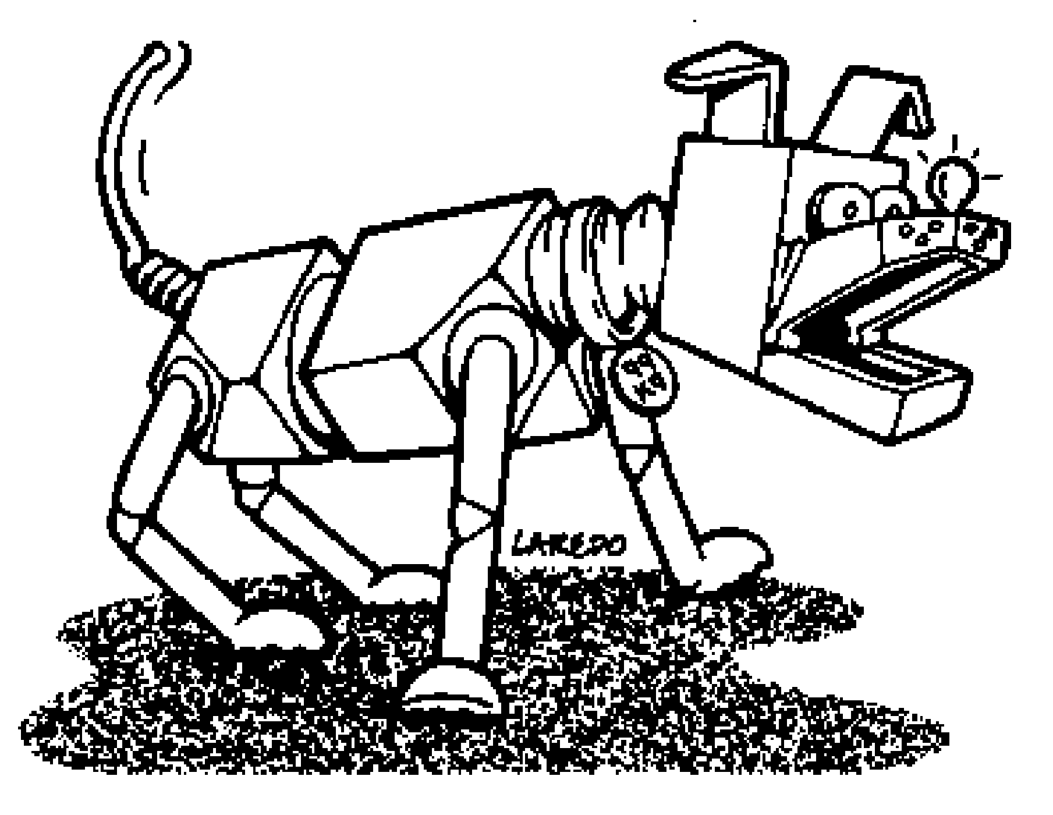

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99'er Home Computer Magazine is looking for articles in all areas of interest that concern Texas Instruments personal computers. Here are the kinds of articles that we want you to write for us:

- Are you a businessman, professional, hobbyist, scientist, or engineer with an interesting microcomputer application? Tell us how it works, what problems you've had to overcome, and what recommendations you have for others. We're especailly interested in sharing user-written software with our readers.
- Have you recently purchased a piece of hardware or software that hasn't quite come up to your expectations, or has, on the other hand, impressed you with its performance? We're looking for comprehensive product and book reviews from different perspectives.
- Are you an educator or parent with something to contribute to computer-assisted instruction (CAI)? We're always looking for new ideas and fresh approaches to educational problems.
- Have you created any unusual computer games or simulations? Let our readers experience your excitement and pleasure.
- Perhaps you've modified your microcomputer or have interfaced it with some unique or useful hardware. Send us your how-to-do-it story.

These are just some ideas. Perhaps you have others. Don't worry if you're not a professional writer. Our editorial staff stands ready to help polish up your manuscripts. And we'll be more than happy to send you a copy of our author's guidelines.

Please send your double-spaced typed manuscripts, plus disks or casettes (recorded on both sides) if the article includes program material, to:

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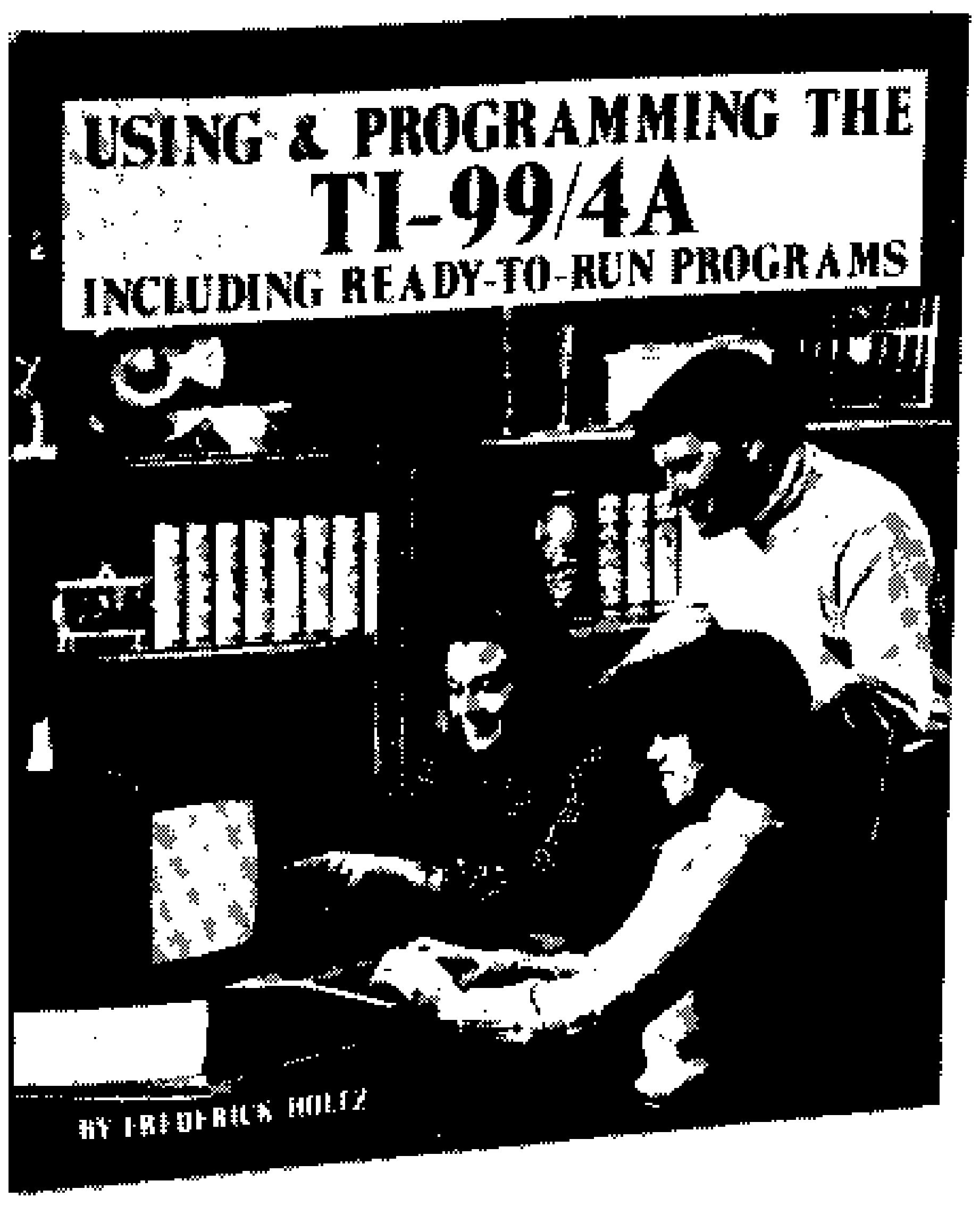

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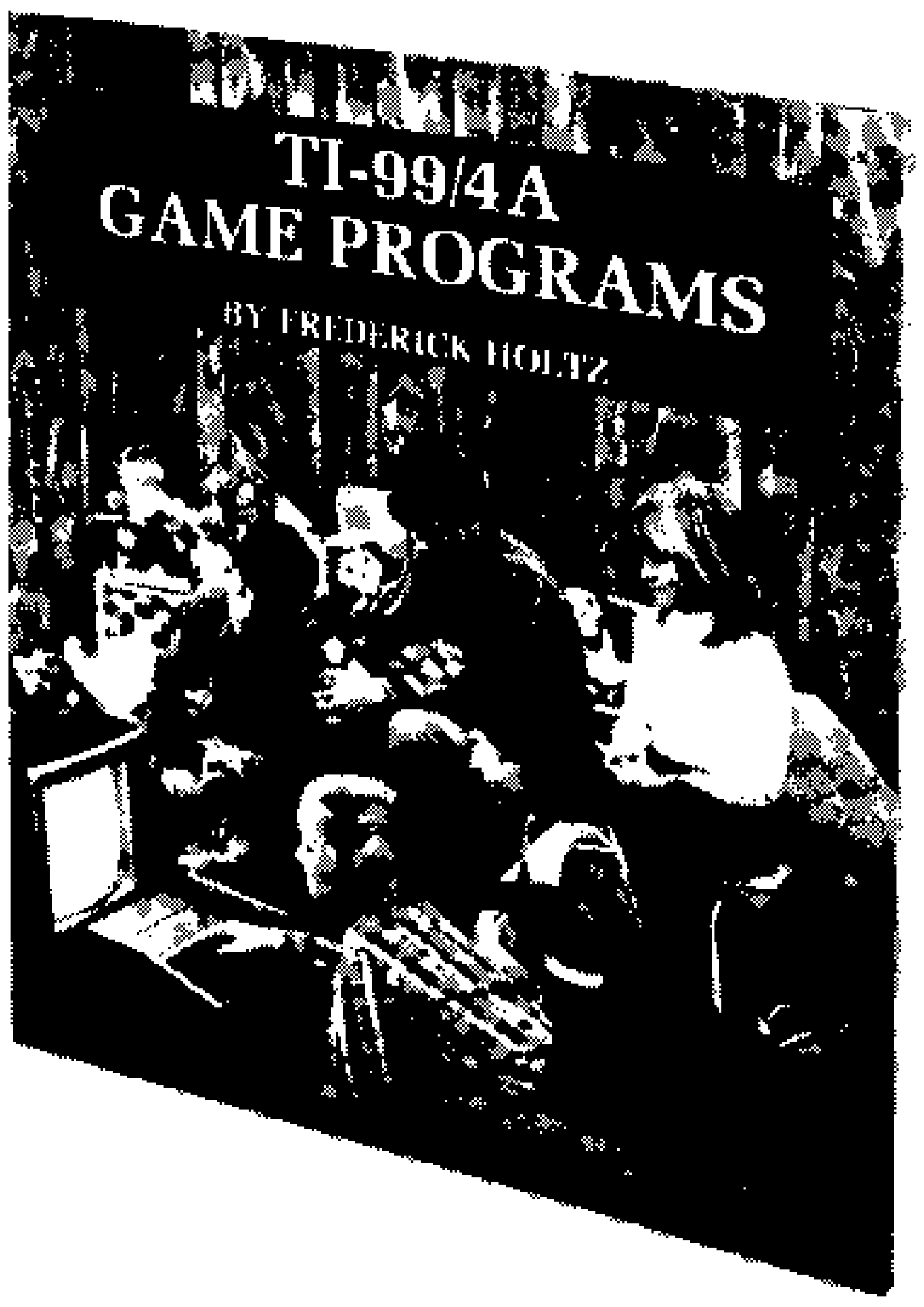

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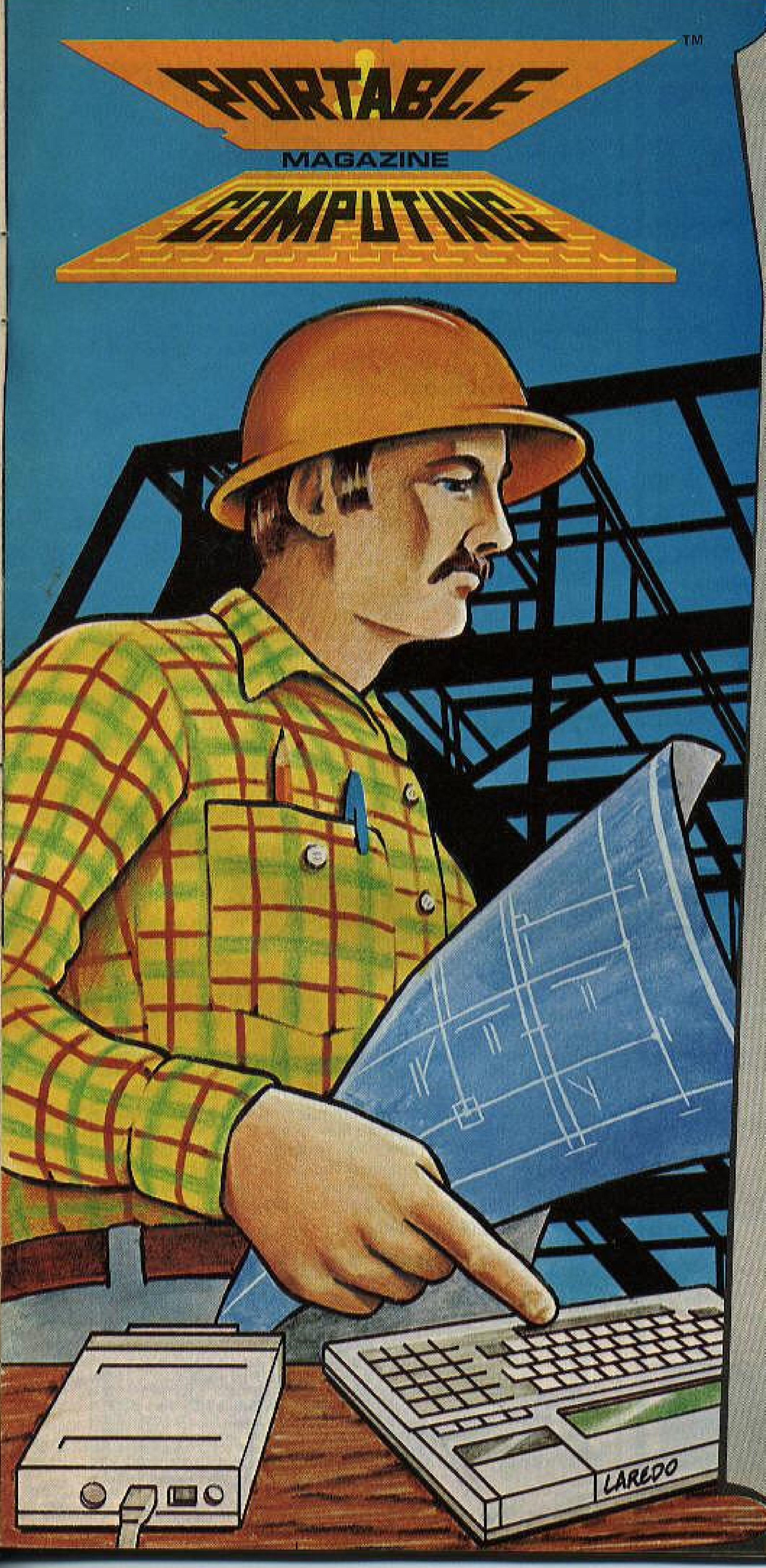

Take the Data and RUN

By Robert Ackerman
Technical Editor

In the not too far distant future, engineers and accountants, surveyors and real estate appraisers, will regard as quaint the practice of carrying a notebook and pencil into the field in order to record information about their jobs. One of the tools which will help hasten the disappearance of notebooks is the notebook computer, like the CC-40. With its nonvolatile memory—which will run on penlight batteries and store programs as long as the batteries last—and its battery of portable peripherals, the CC-40 will change the way many professionals go about their jobs.

A Digital Notepad

The CC-40, allied with its Wafertape™ Digital Tape Drive, is a powerful information storage and preprocessing tool for use in the field. (It is also a powerful information processor in its own right, but for the moment we'll ignore that capability.) In this article, we'll look at one way in which it might be used, and in doing so, extend the miniprograms from the August *PCM* article. Again, the Wafertape serves as an intermediary between the CC-40 and the 99/4A, and becomes a sort of digital notepad. The CC-40 Enhanced BASIC program will set up a file on a Wafertape, screen input data, allow the user to edit it and then store it on the tape. The Extended BASIC program will read the data from the Wafertape, display it on the monitor and then set up a random-access disk file. This file, coupled with a linked list index (see "Getting Down to Business," *99'er HCM*, Volume 1, Number 5), will allow complex recall and processing operations.

The Enhanced BASIC program accepts four pieces of information in every recording cycle: two labels, here called "Name" and "Type," and two numbers, "Quantity" and "Price." The labels are alphanumeric; the first is 20 characters long and the second 15. "Quantity" is a four-digit integer; "Price" is a nine-digit positive decimal number. With suitable alterations to the programs, however, any number or sort of information could be substituted.

The program first sets up the file on which this data is to be stored. Because of the nature of Wafertape, it is probably best to store the data on a file all by itself,

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so that you can add data to it at some later date. The program will first prompt you to give it a *devicenumber.filename*. The assigned numbers for Wafertape are 1 through 8; the file name is of your own choosing. In this case, the default value (the NULL value in line 180, specified by merely pressing [ENTER]) is "1.DATA"—a file called DATA on Wafertape drive 1.

The program then asks if the file is old or new. If it's new, it initializes or FORMATs the tape, eliminating access to all other information on the tape. It's as if the tape had been cleanly erased. If the file is old, it then OPENs the file. And here lies the reason why it's best only to have the one file on the tape: It's always the *end* file. Since it is, you can always add to the end. If other files were on the tape, however, adding to the end of this file might not be possible—you would either have no space or write over the next file. For this reason, APPEND isn't a valid *open-mode* with Wafertape. So we'll take the default, UPDATE, and read down to the end-of-file marker (line 470), in order to begin writing at the end of the file.

Taking Notes

At this point, the program begins prompting for input data. It displays a prompt label, and waits for you to input the data following the prompt. You'll notice that all the prompt lines are followed by a semicolon. This creates a *pending print*, which clears the rest of the display and keeps the display on the screen. The ACCEPT statements, which input the data, all have a *negative* parameter in the SIZE field. This keeps the previously displayed information from being erased. Each ACCEPT statement screens the data being entered for the proper type, using the VALIDATE field. (If the possibility is available to you, as it is in Extended and Enhanced BASIC, you should always try to screen input for the proper type and size to avoid difficulties later in your program or system.) Because of the peculiarities of the CC-40, an ACCEPT statement can only accept data in columns 1 through 31; if you want to put prompts on the same line—generally a good practice—you'll have to keep them concise. Once you've entered a set of data, you have a chance to review it (you have to scroll across the display to see it all), and then edit it if need be.

After you've entered and edited the data, the computer will store it on tape. In this case, it stores each bit of information as a separate record in the DISPLAY format, so that the 99/4A can read it. Using four records is not as space-efficient as some other methods, but it makes for a clear, concise and easy-to-read program. It is also not as wasteful of space as it would be on cassette tape, because Wafertape is *digital*, not *audio*. On cassette, each record on a file is preceded by a tone that signals the system that data follows. That tone can be considerably longer than the record that follows, especially if the records are short. Thus the audio signal could take up more space on the tape than the data! By contrast, the Wafertape's record markers are relatively short.

The Extended BASIC program presented here reads the Wafertape through the Hex-bus, displays the data on the monitor and allows you to edit it set by set before sending it to the random-access file on disk. One programming feature to note in both programs: When reading from files (line 470 in the CC-40 program; lines 210-240 in the 99/4A program), the first statement checks for the end-of-file marker. This prevents the program from crashing if there is no data on the file. In these programs, it wouldn't make much difference. In others, however, it could save you a lot of frustration.

```
100 ! Data Transfer Program
110 ! CC-40 Enhanced BASIC
120 ! Set up
130 N$="Name: ":T$="Type: ":P$="Price: ":
Q$="Quantity: "
140 IMAGE Name: #################### Typ
e: ###############
150 IMAGE Quantity: #### at $######.##
160 ! Set up for Old or New Files
170 DISPLAY "Enter dev.file: ";
180 ACCEPT AT(17)SIZE(-13)VALIDATE(UALPHA
,NUMERIC)NULL("1.DATA")BEEP,DF$
190 DISPLAY AT(1),"Old or New file? (O or
 N) ";
200 ACCEPT SIZE(-1)VALIDATE("OoNn")BEEP,K
$
```

```
210 IF K$="N" OR K$="n" THEN FORMAT 1
220 OPEN #1,DF$,DISPLAY
230 IF K$="O" OR K$="o" THEN GOSUB 470
240 ! Accept data from the keyboard
250 DISPLAY ERASE ALL,N$; :ACCEPT SIZE(-2
0)VALIDATE(ALPHANUM),NAME$
260 DISPLAY ERASE ALL,T$; :ACCEPT SIZE(-1
5)VALIDATE(ALPHANUM),TYPE$
270 DISPLAY ERASE ALL,Q$; :ACCEPT SIZE(-4
)VALIDATE(DIGIT),Q
280 DISPLAY ERASE ALL,P$; :ACCEPT SIZE(-9
)VALIDATE(NUMERIC),P
290 ! Proof the input data
300 DISPLAY ERASE ALL USING 140,NAME$,TYP
E$;
310 DISPLAY SIZE (-28)USING 150,Q,P; :PAU
SE
320 ! Check for corrections
330 DISPLAY AT(1)ERASE ALL,"Corrections?
(Y or N) "; :GOSUB 450
340 IF K$="Y" OR K$="y" THEN GOSUB 490
350 !Output the data to Wafertape
360 PRINT #1, NAME$:PRINT #1,TYPE$:PRINT
#1,Q:PRINT#1,P
370 !Check for more data
380 DISPLAY AT(1)ERASE ALL,"More data? (Y
 or N)"; :GOSUB 450
390 !Stop or repeat
400 IF K$="N" OR K$="n" THEN CLOSE #1:STO
P ELSEGOTO 250
410 !
420 !Subroutines
430 !
440 !Check for Yes or No
450 ACCEPT SIZE (-1)VALIDATE ("YyNn"),K$:
RETURN
460 !Advance to End-of-File, if Old file
470 IF EOF (1) THEN RETURN ELSE INPUT #1,
A$,B$,C,D:GOTO 470
480 !Edit and correct data entry
490 DISPLAY ERASE ALL,N$;NAME$;
500 ACCEPT AT(7)SIZE(-20)VALIDATE(ALPHANU
M)BEEP,NAME$
510 DISPLAY ERASE ALL,T$;TYPE$;
520 ACCEPT AT(7)SIZE(-15)VALIDATE(ALPHANU
M)BEEP,TYPE$
530 DISPLAY ERASE ALL,Q$;Q; :ACCEPT AT(12)
SIZE(-4)VALIDATE(DIGIT)BEEP,Q
540 DISPLAY ERASE ALL,P$; :DISPLAY SIZE(-1
0)USING"$#####.##",P;
550 ACCEPT AT(9)SIZE(-9)VALIDATE(NUMERIC)
BEEP,P
560 RETURN
```

```
100 !Data Transfer Program
110 !99/4A Extended BASIC
120 !Set up files
130 CALL CLEAR :: CALL SCREEN(13):: DISPL
AY AT(3,3):"Input File: 1.DATA"
140 ACCEPT AT(3,15)VALIDATE(UALPHA,NUMERI
C)SIZE(-13):IN$
150 OPEN #1:"HEXBUS."&IN$,INPUT,SEQUENTIA
L,DISPLAY
160 DISPLAY AT(3,3):"Output file: DSK1.DA
TAFILE"
170 ACCEPT AT (3,16)VALIDATE(UALPHA,NUMER
IC)SIZE(-14):OUT$
180 OPEN #3:OUT$,RELATIVE,DISPLAY
190 !Begin inputting data
200 CALL CLEAR
210 IF EOF (1) THEN GOTO 410
220 LINPUT #1:NAME$
230 LINPUT #1:TYPE$
240 INPUT #1:Q,P
250 DISPLAY AT(3,1):"Name: ";NAME$
260 DISPLAY AT(4,1):"Type: ";TYPE$
270 DISPLAY AT(5,1):"Quantity: ";Q
280 DISPLAY AT(6,1):"Price: ";P
290 DISPLAY AT(8,1):"Any changes? (Y or N
)"
300 ACCEPT AT(8,24)SIZE(-1)VALIDATE("Y,N,
y,n"):K$
310 IF K$="N" OR K$="n" THEN GOTO 370
320 !Edit input if necessary
330 ACCEPT AT(3,7)SIZE(-20):NAME$
340 ACCEPT AT(4,7)SIZE(-15):TYPE$
350 ACCEPT AT(5,12)SIZE(-4)VALIDATE(DIGIT
):Q
360 ACCEPT AT(6,9)SIZE(-9)VALIDATE(NUMERI
C):P
370 !Output to disk
380 Print #3:NAME$ :: PRINT #3:TYPE$ :: P
RINT #3:Q ::PRINT #3:P
390 GOTO 210
400 !Display end message and close files
410 CALL CLEAR :: DISPLAY AT(10,3):"End o
f data"
420 CLOSE #1 :: CLOSE #3 :: STOP
```

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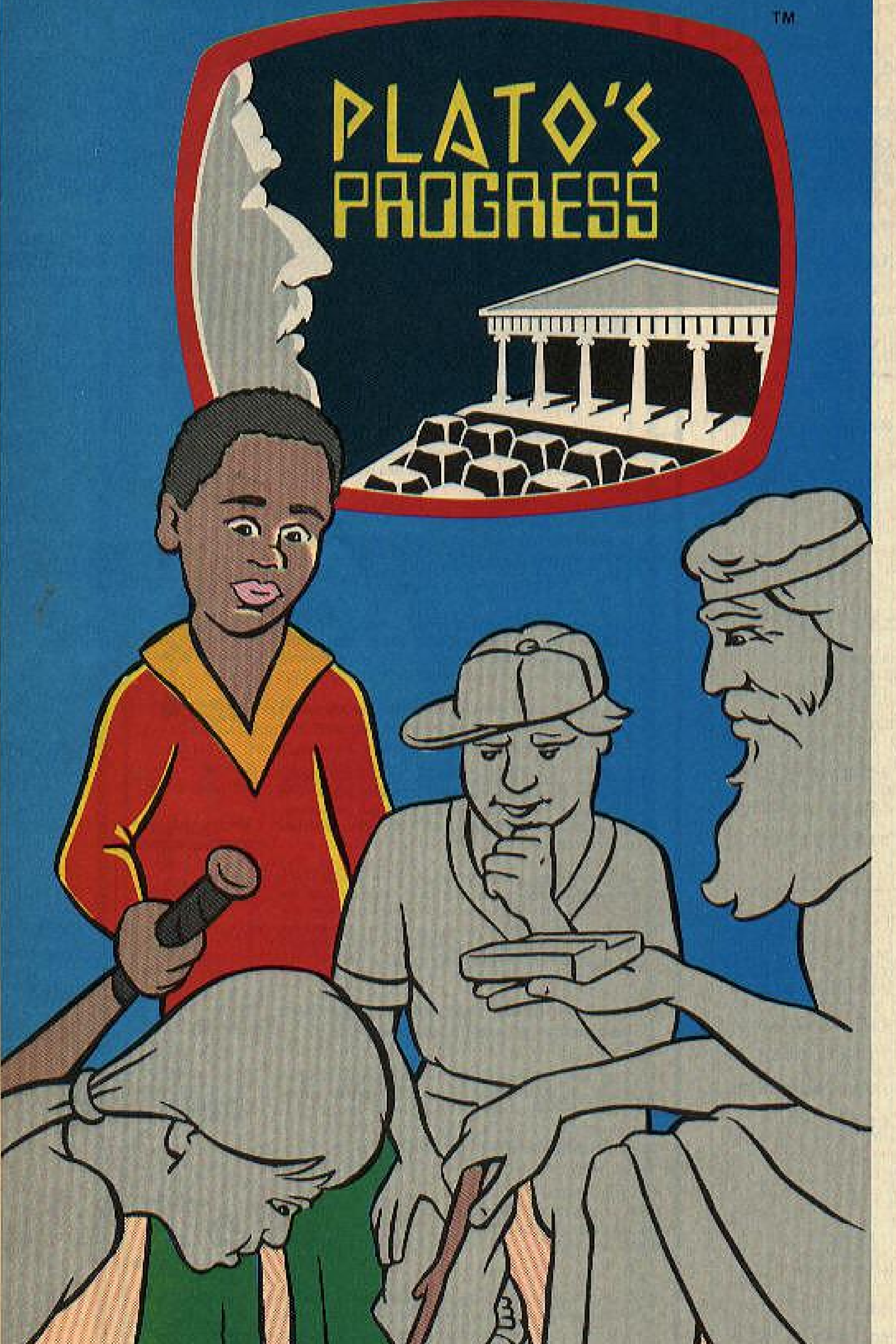
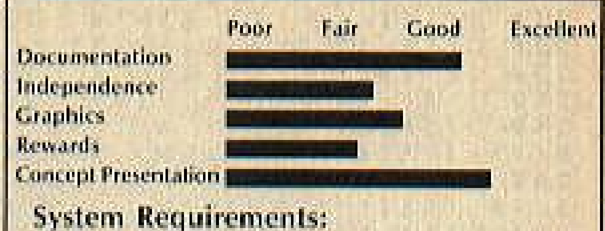
PLATO'S PROGRESS





System Requirements:
Disk Memory System,
Memory Expansion,
PLATO Interpreter Command Cartridge

Who wants to study *now*? Even though school has started again, it's still warm outside and there are so many other things to do. This month we have an enterprising young visitor to the Academy who used to sing this lament, until PLATO came to his rescue.

Casey Jones has two loves in life. One is playing baseball for Mudville High School, and the other is certainly not math! This is not to say that he isn't good at math, it is just that he would rather be at baseball practice and needs a gentle push to keep up with his work in math. So his parents decided to set their Home Computer to the task of motivating and teaching their son at home. They reasoned that by using the 99/4A, their son could get help without extra expense. They also wanted to spare Casey the embarrassment that often accompanies private tutoring. Actually, using any form of computer-assisted instruction has become a status symbol these days. More and more parents can be heard explaining to their friends: "Yes, my son/daughter is really into computers." Many parents like the high–tech sound of that line because an association with the computer implies that their child is bright. They also hope that this exposure will mean job security for the child in the future. While this remains to be seen, computer learning is a tremendously powerful way to hasten and enhance the learning process, and PLATO takes good advantage of the computer's instructional powers.

The package Mr. and Mrs. Jones picked out for Casey is from the *High School Skills* program. Like the rest of the PLATO courseware, this package allows students to make good use of the advantages of a computer learning system. Unlike its human counterpart, PLATO is always available, never irritable; nor will it ever accidentally embarrass a student. It is infinitely patient and never moves too quickly or too slowly because the student sets his own pace and picks his own time to be tutored.

The *High School Skills* package provides 188 different programs in 5 separate subjects. To prepare Casey for this semester's Geometry class, his parents chose the *Pythagorean Theorem* and the *Circles, Arcs,* and *Circumferences* diskettes from the Geometry courseware. Each of these two program disks is divided into four parts:

- *The Purpose* is a statement at the beginning of the program that explains what concept will be taught on the disk.
- *The Tutorial* section teaches the concept described in the purpose statement.

---

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The Shape of Things To Come.

GEOMETRY COURSEWARE

By Sharyn Lyon
Technical Editor

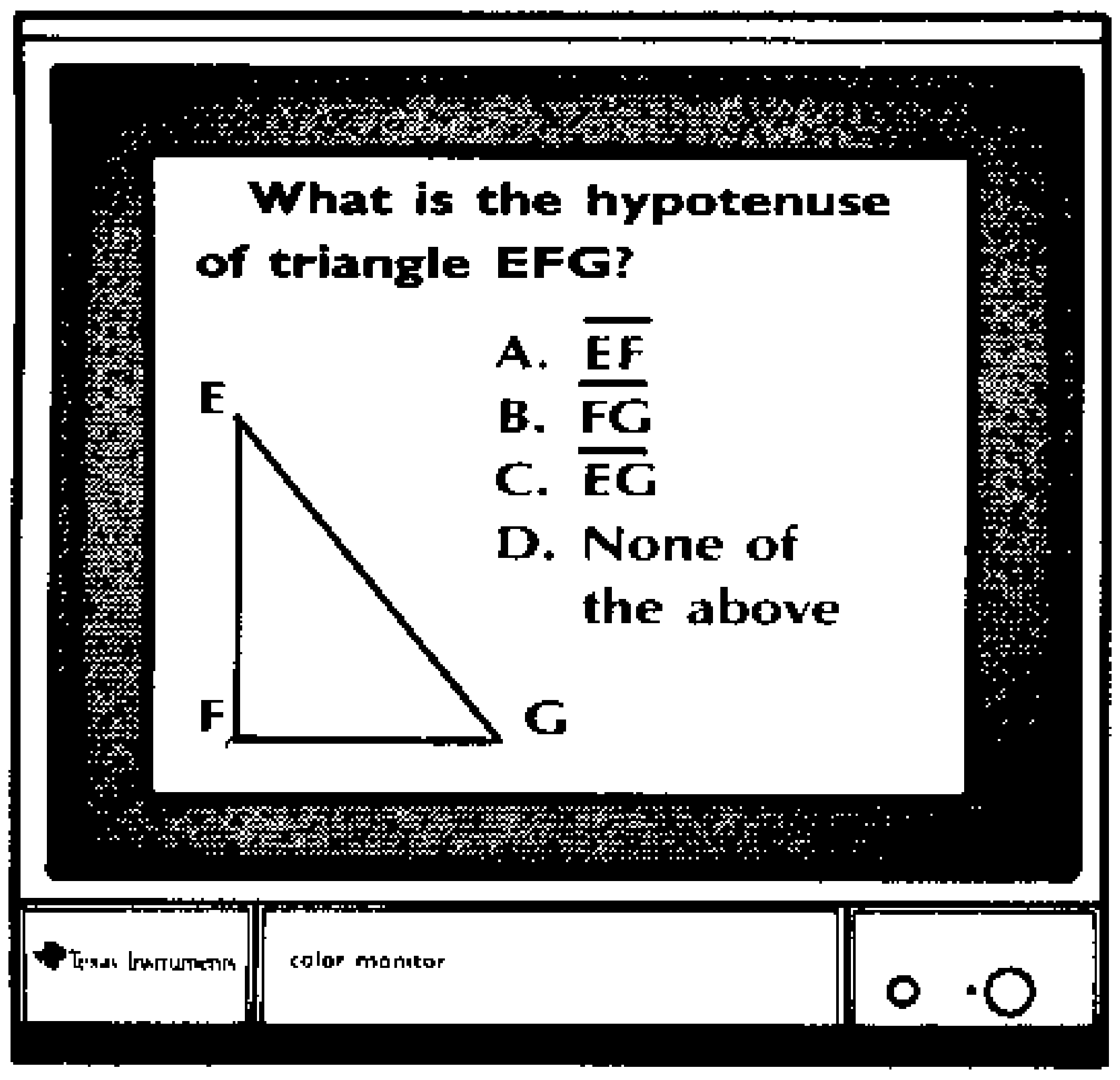
- *The Dictionary* [D] displays unfamiliar terms that the student must understand in order to learn from the tutorial.

- *The Drill* provides practice in the concept without instruction.

Teach Me Tonight

The Tutorial section uses a format which presents information in fewer than ten consecutive screen displays. Then a series of screens asks questions pertaining to the information the student has just learned. Periodically, the student may press [FCTN] [9] (BACK) for a short review of that information before going on to tackle more.

Although the tutorial is not exacty lively, it does present a great deal of information in a clear and concise manner. For example the following screen appears after the word *hypotenuse* has been defined:


What is the hypotenuse of triangle EFG?

A. $\overline{EF}$
B. $\overline{FG}$
C. $\overline{EG}$
D. None of the above

If the word has been satisfactorily explained to Casey, he will pick answer C. The screen that follows builds on this one and asks a question on the next level of inference: WHAT IS THE HYPOTENUSE OF TRIANGLE ABC? (ABC is not a right triangle). With this concept under his belt, Casey can go on to learn how to use the Pythagorean Theorem and concepts from subsequent screens, to calculate the length of the legs of any given right triangle—just as Pythagoras did in Greece way back in 540 B.C!

Oops!

Errors are easily handled in these PLATO packages because the student presses [ENTER] when his answer is ready. To correct a typing mistake he can use any of the error handling methods built into the console. The easiest of these to use is a combination of [FCTN] and the arrow keys to go back to the mistake and type over it. In the Tutorial section the student has two chances to deduce the correct answer before it is displayed. When he presses [ENTER] to continue, the program does not go on to the next question but gives him the opportunity to input the correct answer. In this way he is rewarded for persevering with the task, and the correct answer is impressed upon his memory.

The Drill section presents its questions differently. Here the program expects the student to get the answer right the first time. If Casey answers incorrectly, he will be told the right answer and may be given a detail that will help him answer correctly the next time. If he pays attention to these pointers he will learn something from even this part of the program.

If it is used before the Tutorial section, the Drill section can also function as an assessment vehicle. It gives the student only one opportunity to answer correctly and provides him with a Progress Report which displays the total number of correct answers and questions attempted. A student can then use these results to decide whether or not he needs to work with a particular program. Whether used as a placement tool or for practice, this section does not attempt to teach. Its primary purpose is to provide what educators call "appropriate practice." Since the numbers used in the questions are randomly generated each time the program is run, PLATO provides an infinite number of questions for the student's practice.

After Casey completed the Tutorial and Drill options on the program, he tried some of the other subject area options that each program disk offers. ADDITIONAL STUDIES lists the other subject areas available in the PLATO High School Skills library and SELECT ANOTHER DISKETTE simply prepares the system to accept a new disk. This feature makes changing programs convenient and easy.

Look In The Book

Much of the documentation is right on the screen for the student to follow as he works on the program,so there was no need for Casey to refer to the manual once the program was running. Casey did miss the screen explanation of the keyboard which had been so helpful on the Survey Diskettes. He only had to know a few keys in order to use these two programs, however, so he quickly became comfortable with the keys.

The manual's documentation could be more complete. Casey was not able to see beforehand what either of his programs looked like on the screen because the documentation provides examples from only the first program in the Geometry series—Special Angles Part 1. A sample screen in the documentation for each activity program within the general courseware headings would be helpful. The documentation does have some appealing features though. Geometry, for example, begins with an anecdote about how Eratosthenes used geometry way back in 250 B.C. to estimate the radius of the earth. High school students can read this and the two pages which follow (outlining the contents of the diskettes on Geometry) to get an overview of what is in store for them in each category. Details ranging from how to insert your diskette to those screen pictures of each type of lesson within the diskette help the student to pick up the flavor of the courseware before he actually commits himself to a program.

> **"Since the numbers used in the questions are randomly generated, PLATO provides an infinite number of questions for the students' practice."**

PLATO's Protégés

Fortunately, Casey is a good reader, motivated to get familiar with what he might encounter this fall in Geometry class. PLATO is geared to this kind of student. The Courseware also speaks to students who need to review skills from a previous year, to prepare for an examination, or to practice skills they are in the process of learning elsewhere. PLATO would probably not work so well for remedial students because its effectiveness is so dependent on text screen instruction. There are no visual or audio rewards to help build confidence in remedial students. In even the Tutorial sections the vocabulary and reading levels would frustrate underachievers. It would be best for most students (and necessary for some) to have a responsible and sensitive person on hand to interpret and help pave the way through the programs. The student should also have someone to dangle a "carrot" in front of him to help keep him going when the courseware gets rough. If the student has his own compelling reason(s) for mastering the course contents (to pass an exam, for example), that may be motivation enough. If not, even a student like our young Mr. Jones will need an extra boost now and then because the programs themselves do not provide such

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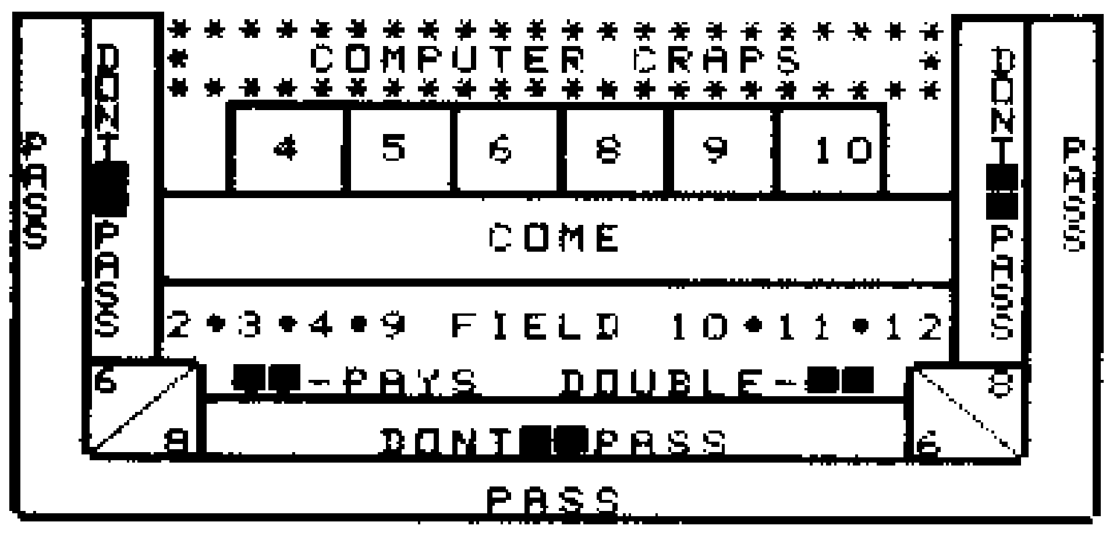

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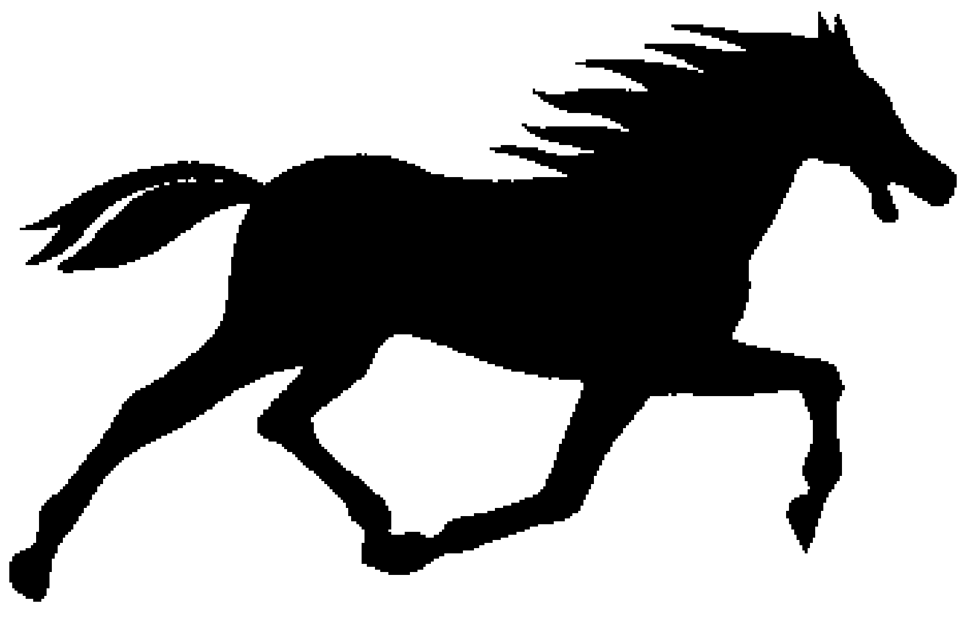

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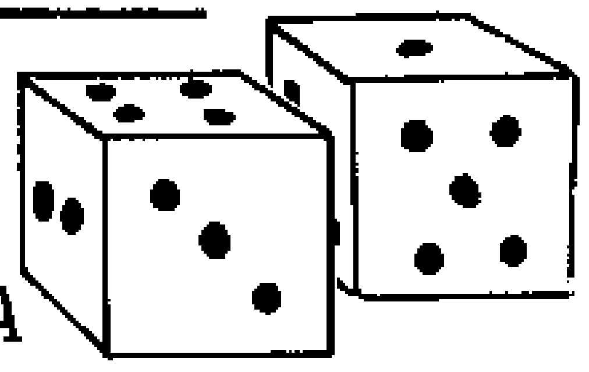

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motivation as an entertaining scenario, intriguing progress report, or graphic stimulation. These items may seem unimportant to some, but they do help most students keep going when things get discouraging.

PLATO's Logical Prowess

PLATO's greatest strength is its logical presentation of concepts. As in the Basic Skills Survey Diskettes, each concept in the Tutorials has been abstracted into its logical steps. When the student elects the Tutorial option, he can be confident that all steps in the teaching process are present in logical order. It was reassuring for Casey's parents to know that once their son had mastered one step he could confidently go on to the next without worrying about whether he would have the necessary background to proceed.

This step-by-step progression did cause a problem, however, when it came to this screen from the Drill section of *Circles, Arcs, and Circumferences*:

What is the circumference of a circle with a radius of 2?

A. approx. 2x2x3.14
B. approx. 2x3.14
C. approx. 6.28
D. approx. 4π
E. None of the above

Casey's answer was D, approx. 4π. He reasoned that since the formula for the circumference of a circle is $2r \times \pi$, he should multiply 2x2 and state the answer as elegantly as he could—4π. The program responded with:

"NO, THAT'S THE AREA. THE CORRECT ANSWER IS A."

At first glance A and D appear to be different ways of stating the same thing, but for two reasons, A is correct. First of all, if Casey had picked Answer A, his response would have shown the computer that he understood the step which explained the formula for finding the circumference because he would have put the value of the radius in its proper place in the formula. The second reason that A is correct became clear when Casey called up the problem again to point out the computer "error" to his mother. This time, the question used a different number for the radius. So that now answers A and D read:

A. approx. 2x9x3.14
D. approx. 81π

With the number nine as the radius, the intent of the question becomes clear. Answer D is now obviously the result of the formula for the area of a circle (2r squared x π) and not the result of the formula for the circumference ($2r \times \pi$).

The program randomly generates new values for the radius each time the question is called up, and it just so happens that the first value for the radius that Casey got (2) was the only number which would make it look like there were two correct answers to the question (since 2 squared and 2x2 both equal 4).

Shaping Up

As Casey worked his way through these two diskettes, he began to feel more secure with the terms, formulas and symbols of Geometry. His parents enjoyed the way going over this courseware helped clear the cobwebs away from their high school memories of geometry. PLATO's quick, memory-jarring techniques might also be used to prepare for a high school equivalency exam or in training adults for jobs.

The courseware we have looked at here does contain some minor inconveniences. In order to take a second look at a problem in the Tutorial section, for example, you have to go back through the entire disk unless the problem you want to review appears before the BACK option in the Tutorial. It should be noted that this is only a minor inconvenience because the process of going back through the disk does not take very long. The computer

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goes from question to answer to the next question almost as fast as you can press [ENTER]. This kind of quick response is a rarity in educational programs we have seen and makes the program smooth and anything but tedious to use.

Even going back through the entire program is not too bad because of the lightning fast pace you can set for yourself due to the program's quick response. Casey especially appreciated being able to adjust his learning pace. As he got better, he could go through the material more quickly and get out on the baseball diamond faster. By the time September rolled around, he was no longer bemoaning having to study geometry instead of playing baseball. He really had begun to look at life quite differently. In fact, these days he can be found huddled close to his console, deep in the process of calculating how he can hit the ultimate home run based on: *the circumference of the ball, the angle of the bat times the force of the swing, which will result in the projectile lobbing gracefully over the center-field fence some 390 feet from home plate.* Thanks to PLATO, there will be joy in Mudville next season with this Casey at the bat.

Educational Activity Review Criteria

Documentation—rates the printed matter that comes with the activity. It notes whether the instructions are clear, comprehensive and easy to use, and whether the machine configuration requirements are spelled out, and looks for such information as how to load the program, use the keyboard, and restart the activity.

Independence—focuses on how complicated it is for the user to understand the steps needed to progress through the learning activity. It measures to what degree the activity may be done by a user and the computer alone without parent/teacher guidance. Whether the actual reading level of the activity is appropriate for the suggested grade level is another major concern of this rating category.

Rewards—rates the audio-visual rewards as to their motivational effectiveness and appropriateness to the activity.

Graphics—rates the quality of the graphics and whether they enhance or detract from the educational purposes of the activity.

Concept Presentation—focuses on whether the concepts are presented clearly, in logical order and in enough depth for the learner to be able to apply learnings from the activity to other situations.

Camelot . . . from p. 39

```
4730 DATA 105,089A92B998D9B1F5,1
     06,301596DBD98CD69F,107,FEF
     CF5FFAE6DD3F7F,112,01030B0F
     1F3FBFFF
4740 DATA 113,80C0C0E0F8F8FDFF,1
     14,FFFFFFFFFFFFFFFF
4750 DATA 97,0000000C0E1E3FFF,98
     ,FFFFFFFFFEFFFEF6,99,030F27
     77FFFFFF7F,100,60F0C8D0A040
     789F
4760 DATA 142,0,101,80E0F0FACD84
     8080,102,00010103070F3FFF,1
     03,80808040A0508CFF
4770 DATA 104,44EE776666666666,1
     05,6666666666666666,106,FFC
     C3333CCCC33FF
4780 DATA 131,393B94DA3D06334F,1
     32,030CB1C1416BA7F7,133,00
     000E0E08,140,E6FE2F31010A04
4790 DATA 131,000000000001314F,1
     32,00000101010B0777,140,06F
     E1F03010A04
4800 DATA 58,0000000707070100,59
     ,0000808080D0F0FF,60,000000
     008000ECF3
4810 DATA 120,0,121,0,122,0,123,
     040201000033059FF,124,00000
     1875F3FEFDF,125,0070FCFFFFE
     FEFDF
4820 DATA 126,00000000C0F0FEFF,1
     27,0000000007030DF0
4830 DATA 120,00000030D8FC0F07,1
     21,000000008090B2F6,122,003
     8182840402010,123,0303030A1
     4,124,FEFFFFFFFF77073F
4840 DATA 125,C0D0F8F8FCFFFFC7,1
     26,0C020101021CF0C,127,00
4850 DATA 16,10,16,1,12,1,1,1
```

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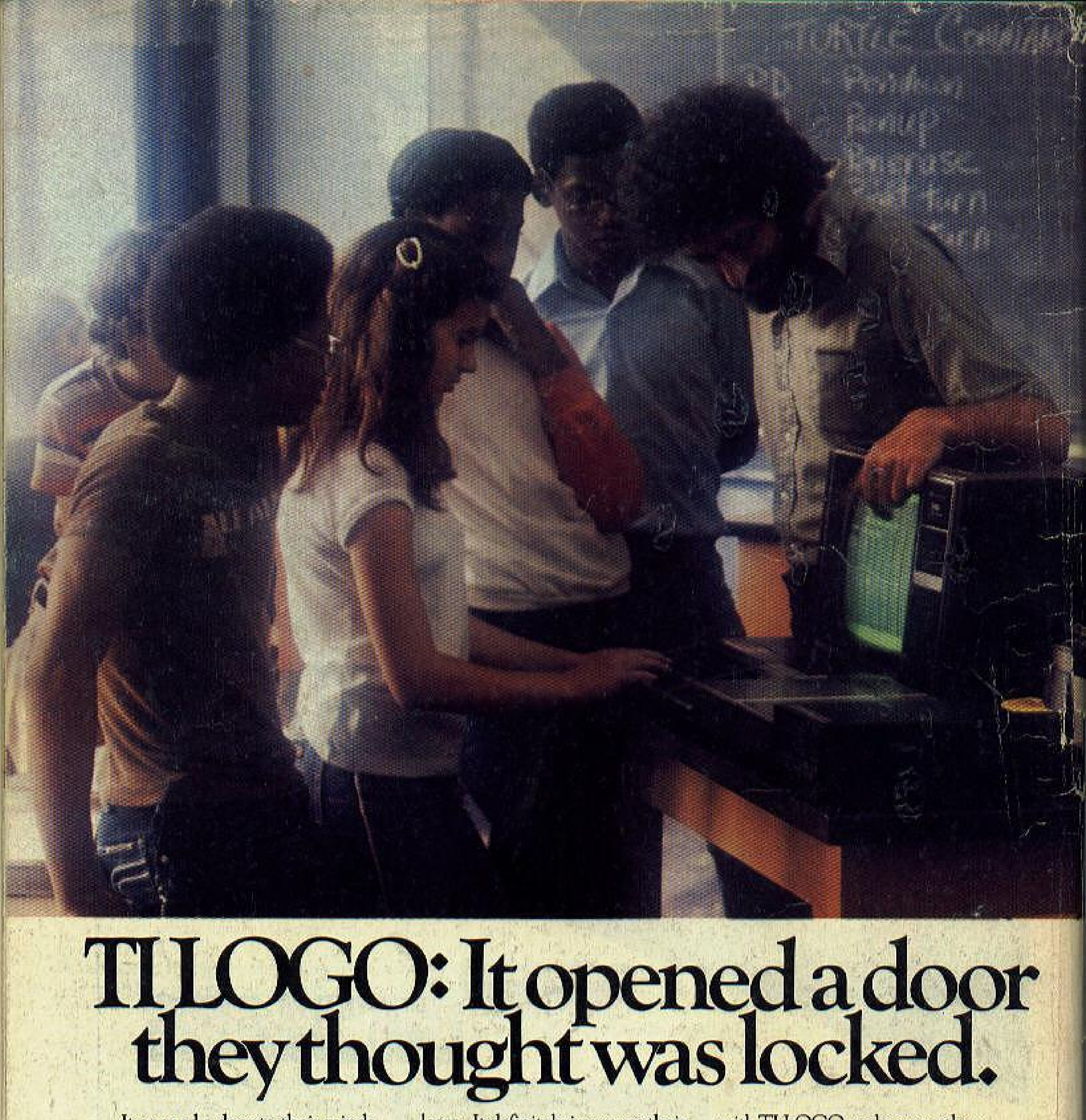

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